

# CHM2046 – GENERAL CHEMISTRY II – SUMMER 2023

**COURSE DELIVERY:** This course will be delivered in a **synchronous HyFlex format**. The lectures will be held in CLB130 from 9:30 to 10:35 AM on Mondays, Tuesdays, Wednesdays, and Fridays. Students can attend in person or via Zoom. The Zoom link is posted on the Canvas course homepage at the top. Discussion sections will be held in-person. Your discussion section will meet on Thursdays as per your schedule in ONE.UF. Exams are in-person.

**INSTRUCTORS:** e-mail via canvas (for administrative purposes). Expect a reply within 48 hours or on a Monday after a weekend.

<p><b>May 15 through June 23</b> <b>Dr. Martina Sumner</b> E-mail (for administrative purposes): <a href="mailto:m.sumner@chem.ufl.edu">m.sumner@chem.ufl.edu</a></p>	<p><b>July 3 through August 11</b> <b>Dr. Steven Harris</b> E-mail (for administrative purposes): <a href="mailto:steven.harris@chem.ufl.edu">steven.harris@chem.ufl.edu</a></p>
<p><b>Office Hours (in-person)</b> Zoom via request. MTWR: 12:45 – 1:45 pm W 11 to 12 pm F 8:45 to 9:20 AM</p>	<p><b>Office Hours</b> TR: 12:15 pm – 1:30 pm W: 11 am to 1:30 pm R: 9:30 to 10:30 am</p>

**MATERIALS:** The text Chemistry: The Molecular Nature of Matter and Change, 9<sup>th</sup> ed., Silberberg & Amateis (McGraw Hill) is required. Access to the textbook is via the ALEKS platform, accessed through a link in your Canvas course. A portion of your grade is determined from electronic adaptive homework (ALEKS) via the same link. You must purchase ALEKS360 (both the text and electronic homework) for the course.

There are two options for purchasing access to homework/ebook: **Option 1:** consent to have the purchase price charged to your student account following the directions posted on the course homepage in Canvas; this is a time-limited option after which only Option 2 is available. **Option 2:** purchase an access code for the materials at the UF Bookstore (at a slightly higher price).

To opt in, navigate to: <https://bsd.ufl.edu/allaccess>. Click the “Opt In” tab or view the “View Eligible UF All Access Classes” button. You will be prompted to log in using Gatorlink credentials. Follow the prompt to authorize charges to your student account. The access code will then be provided. Copy the access code to your clipboard. In the Canvas course, click on the ALEKS module, and provide the access code when prompted to do so. If you have any questions about the authorization process or refunds, contact [Included@bsd.ufl.edu](mailto:Included@bsd.ufl.edu).

A paperback version of the text is completely optional. The bookstore may stock paper versions of the text, or you can order one directly through the McGraw Hill website. A paper

version is on reserve at the Marston Science Library for reference purposes.

All other assigned material will be available through Canvas.

**Iclicker** for answering clicker questions during lecture (free).

**Calculator:** You will require a calculator capable of logarithmic functions. For exams, the calculator must be non-graphing and non-programmable. The calculator you had for chm2045 should be fine. A TI-36 does do quadratic functions and will be useful.

**CONTACTING THE INSTRUCTOR / OFFICE HOURS:** Emails are for administrative purposes only, and not for distance-instruction. All academic inquiries must be made office hours. If this is not possible, visit the graduate TAs office hours (schedule posted on Canvas). Please be prepared before coming to office hours, bring specific questions and your previous work.

**DESCRIPTION:** CHM 2046 and CHM 2046L constitute the second semester of the two-term sequence of General Chemistry, CHM 2045/2045L - 2046/2046L. Prerequisite information and credit suitability can be found in the Undergraduate Catalog. Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

**PREREQUISITES:** Please refer to the [undergraduate catalog](#) for placement and prerequisite information.

**COURSE OBJECTIVES:** As both a general education requirement and major's course, CHM2046 serves to teach: the scientific method, skills for problem solving, general chemistry knowledge, and a connection to the principles that govern the natural world.

**ABBREVIATIONS:** HW: Homework (optional on canvas), PLA: Pre-lecture assignment (required), LA: Lecture assignment (optional), ALEKS: Assessment and Learning in Knowledge Spaces

**GRADES:** Grades for the term will be determined as follows:

3 Progress Exams	60%
Final Cumulative Exam	25%
Worksheets/discussion	5%
ALEKS HW	5%
iclicker	1%
PLA	4%
TOTAL	100%

The following grade cutoffs will be used (these are non-negotiable):

Letter	A	A-	B+	B	B-	C+	C	D+	D	D-	E
Cutoff	90.0	86.0	83.0	80.0	77.0	73.0	69.0	66.0	63.0	60.0	< 60.0

Information on current UF grading policies for assigning grade points can be found at:  
<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

**POSTED GRADES:** Should a student wish to dispute any grade received in this class, the dispute must be in writing (via e-mail to [m.sumner@chem.ufl.edu](mailto:m.sumner@chem.ufl.edu) or [steven.harris@chem.ufl.edu](mailto:steven.harris@chem.ufl.edu)) and submitted to the instructor within one week of the grade being posted to canvas. The deadline for grade dispute for Dr. Sumner's half is June 23. After one week has passed from when the grade was posted and the student made aware of the posting of the grade(s) via an announcement on canvas, the instructor considers those grades final.

## Course Communications

**General Questions:** General course questions should be posed to your instructor during office hours, or to TAs during their office hours or during discussion sessions.

**Private or Grade-related questions:** Direct these to your instructor via the mail function in Canvas. Do not email outside of Canvas to your instructor's external email address – we aren't permitted to discuss grade related questions outside of Canvas. You will be asked to resend the query through Canvas. Instructor response time to email queries is <48 h during the workweek, or the first business day for emails received Friday or over the weekend.

## COURSE POLICIES

**WORKLOAD:** As a Carnegie I, research-intensive university, UF is required by federal law to assign at least 2 hours of work per week outside of class for every contact hour. Work done in these hours may include reading/viewing assigned material and doing explicitly assigned individual or group work, as well as reviewing notes from class, synthesizing information in advance of exams or papers, and other self-determined study tasks.

**ASSIGNMENT DUE DATES:** All due dates for assignments are clearly posted in the course assignments of the Canvas page and reflect the most up-to-date information. All assignments must be completed by the stated due date and time for credit. A Dean of Students note verifying documentation of illness or personal matter must be provided for at least five of the seven days of the week of the assignments' deadline for accommodations to be considered. Extensions will NOT be given because of technical or personal issues that occur within 24 hours of the assignment deadline. No assignment extensions are given. If you want to have access to a particular assignment you need to open and submit it once.

**IClicker:** For in class participation (answering clicker questions on the material that you read for that day, and we are covering that day). Each day is worth 3 points. Several points will be dropped before calculating your final iclicker average.

**PRE-LECTURE ASSIGNMENTS (PLA):** You will be expected to complete pre-lecture assignments in preparation for each class day in canvas. Read the appropriate sections in the

book and watch the JoVE videos before attempting the PLA. These assignments will be posted on Canvas under the quizzes tab and will be due prior to class. You will have multiple attempts to successfully answer the pre-lecture assignments. Three assignments will be dropped before calculating your final PLA grade.

**ALEKS HW (adaptive and videos and EOCs):** You will have multiple attempts to successfully answer the HW questions. A knowledge check will also make sure you still remember the information from an earlier Module.

**DISCUSSION CLASSES/ WORKSHEETS/WORKSHEET QUIZ:** Five percent of the course grade is based upon your attendance at your in-person discussion class and the correct completion of the worksheet. The Discussion Classes meet every Thursday, and your attendance is mandatory. 5 points will be awarded when you attend your discussion class. The worksheet completed on canvas the next day is worth 5 points. A total of 10 points can be earned each week by attending your discussion class and correctly answering the worksheet questions on the canvas quiz (the questions on the canvas quiz are the same but the numbers will be different). The paper worksheets will be posted on Canvas in advance, and you may start working on it before you come to discussion. A canvas quiz will open on Friday and due by 11:59 pm. Any grade discrepancy needs to be addressed within a week of posting grades to canvas to your graduate TA.

**EXAMS:** Exams (assembly exams) will be administered at night from 7 to 9 PM. Exam questions will consist of questions similar to the HW/PLA/worksheet you have completed on canvas and in ALEKS. You must use a non-graphing non-programmable scientific calculator on exams (with log, ln, root, and exponent (scientific notation) functions). Room assignments will be posted to the canvas page prior to the exam. Check out your exam room to see where it is located and what it is like.

Any and all exam grade disputes must be performed within one week of the scheduled exam date.

**Exam Conflict/Absence Policy:** No make-up Progress Exams will be given after the regularly scheduled Progress Exam date for any reason. (1) If you know in advance that you must be absent for a Progress Exam or for the Final Exam due to a documented and approved academic or UF athletic conflict or other pre-approved conflict, bring the applicable documentation to me at least one week prior to the scheduled exam, and an early conflict exam will be arranged for you. Failure to bring documentation and/or obtain one week pre-approval for the early conflict exam will result in your request being denied. (2) If you experience a last-minute unavoidable emergent situation (illness, accident, emergency, etc.) that prevents you from attending an exam, you must do the following: (1) contact the Dean Of Students office and have them confirm your conflict documentation and have them email their confirmation to me, and then you must (2) contact the current instructor of the course as soon as you are no longer ill (no rush – wait until you are well) and/or as soon as you are able to do so. Failure to do these two steps will result in a zero score for the missed exam. (More information regarding this policy can be found in the [General Chemistry Exam Absence Policy](#) found on Canvas.)

**Progress Exam "Average/Replace" Policy:** No Progress Exam scores will be dropped for any reason. However, to help alleviate the stress of potential issues that do not fall under the officially-sanctioned absences described above, and that may affect a Progress Exam score (for example, unapproved exam absence or poor exam performance), the lowest score of the four

Progress Exams will be replaced by the average score of all four of the Progress Exam scores: (Applies to all students). Example (unapproved absence): Exam 1, 70%; Exam 2, 0%; Exam 3, 90%; Exam 4, 80% The Progress Exam 2 score (0%) will be replaced by  $\{(70+0+90+80) / 4\} = 60\%$ . Example (poor exam performance): Exam 1, 70%; Exam 2, 40%; Exam 3, 90%; Exam 4, 80% The Progress Exam 2 score (40%) will be replaced by  $\{(70+40+90+80) / 4\} = 70\%$

## **CANVAS HOMEWORK (HW) and LECTURE ASSIGNMENTS (LA) -**

**OPTIONAL:** Homework (HW) and after lecture assignments (LA) are *optional*. The “due date” is set for the last day of summer C classes (August 11). They do not count towards your grade and can be found under Practice quizzes (quizzes then scroll down). They are highly recommended. To master the material, you will need to do most if not all of those optional assignments.

**CHEMISTRY LEARNING CENTER (CLC):** There is free help available from graduate student teaching assistants. Your discussion TA will have office hours in SFH 105 (the CLC). Additionally, there is the teaching center <http://www.teachingcenter.ufl.edu> which offers some resources for being successful in your chm2046 class.

**HONOR CODE:** UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

**You will receive a 0 for the exam if cheating has been detected.**

**CANVAS (<http://elearning.ufl.edu>):** Here you will find the syllabus, gradebook, files, class announcements, and other pertinent info for the course. It is your responsibility to check Canvas often to make sure that you do not miss important announcements and to ensure that your gradebook is accurate. For computer assistance, visit <http://helpdesk.ufl.edu/>.

## **UNIVERSITY POLICIES**

**STUDENTS REQUIRING ACCOMMODATIONS:** Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <http://www.dso.ufl.edu/drc/>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible.

## **UNIVERSITY POLICY ON ACADEMIC MISCONDUCT**

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.” You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida. The following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g., assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures.

regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/SCCR/honorcodes/honorcode.php>.”

## **IN-CLASS RECORDING**

The class is mediasite captured and available to students after class via canvas.

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor. A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session. Publication without the permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third-party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

## **CAMPUS RESOURCES**

**UF MULTICULTURAL & DIVERSITY AFFAIRS:** Department within the Division of Student Affairs. Multicultural and Diversity Affairs (MCDA) celebrates and empowers diverse

communities and advocates for an inclusive campus for all students across identities. MCDA is located on the second level in the student union. <https://multicultural.ufl.edu/>

**U MATTER, WE CARE:** Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor are available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

**COUNSELING AND WELLNESS CENTER:** Visit [counseling.ufl.edu/](http://counseling.ufl.edu/) or call 352-392-1575 for information on crisis services as well as non-crisis services.

**UF TEACHING CENTER (CLAS):** 1317 Turlington Hall, 352-392-2010 or to make an appointment 352-392-6420. General study skills and tutoring. [teachingcenter.ufl.edu/](http://teachingcenter.ufl.edu/)

**INCLUSIVE LEARNING ENVIRONMENT:** We embrace the University of Florida's Non-Discrimination Policy, which reads, "The University shall actively promote equal opportunity policies and practices conforming to laws against discrimination. The University is committed to non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinion or affiliations, genetic information and veteran status as protected under the Vietnam Era Veterans' Readjustment Assistance Act." We are committed to fostering an open and inclusive classroom and laboratory environment in our college, where every student, guest instructor and contributor feels valued. If you have questions or concerns about your rights and responsibilities for inclusive learning environment, please see your instructor or refer to the Office on Multicultural & Diversity Affairs Website: <http://www.multicultural.ufl.edu/>

**FEEDBACK/EVALUATIONS:** Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>."

## GETTING HELP

For issues with or technical difficulties with Canvas, contact the UF Help Desk: <https://lss.at.ufl.edu/help.shtml>; (352)-392-HELP.

**COURSE SCHEDULE (the lecture schedule is tentative, but exam dates will not change):**

Class date	Topic	Before class	After class (optional)	Silberberg 9 <sup>th</sup> Chapters*
May 15	Kinetics; rate law, integrated rate law, rate constant, mechanisms, theories of chem kinetics	Read syllabus, check out canvas, PLA Ch. 16.6/7	HW ch 16 2045, HW ch 16 review, HW ch 16.4	Ch. 16
May 16	Chemical Equilibrium; K and Q	PLA Ch. 17.1/2	HW ch 17.1/2	Ch. 17.1-2
May 17	Chem eq; relation between K <sub>c</sub> and K <sub>p</sub> , comparing Q and K	PLA Ch. 17.3/4	HW ch 17.3/5, HW ch 17.4	Ch. 17.3-4
May 19	How to solve eq problems	PLA Ch. 17.5	HW Ch. 17(1)	Ch. 17.5
May 22	More solving eq problems, LeChatelier's principle	PLA Ch. 17.5/6	HW ch 17.5/6, HW Ch. 17(2)	Ch. 17.5-6
May 23	LeChatelier's principle	PLA Ch. 17.6	HW ch 17.6, HW ch 17.6 (1)	Ch. 17.6
May 24	Organic chemistry, structure and classes of hydrocarbons, optical isomers	PLA 15.1/2	HW ch 15(1), HW Ch 15.2	Ch 15.1-2
May 26	Some important classes of organic reactions, functional groups	PLA 15.3	HW Ch 15.2(1)	Ch 15.3
May 29	<b>HOLIDAY</b>			
May 30	Functional groups	PLA 15.4		Ch 15.4
May 31	Acid-Base Eq.; autoionization of water, pH scale	PLA Ch. 18.1/2	HW Ch 18	Ch. 18.1-2
June 2	Bronsted-Lowry acid/base definitions	PLA Ch. 18.3	HW Ch 18(1)	Ch. 18.3
June 5	<b>Exam 1 (ch 15-17)</b>			
<b>June 5</b>	Solving problems involving weak acid eq.	PLA Ch. 18.4	HW Ch 18.(2)	Ch. 18.4
June 6	Molecular properties and acid strength; weak bases	PLA Ch. 18.5/6		Ch. 18.5-6
June 7	Acid-Base Properties of Salt solutions	PLA Ch. 18.7		Ch. 18.7
June 9	Lewis Acid-Base definitions, electron-pair donation	PLA Ch.18.8/9	HW Ch. 18	Ch. 18.8-9
June 12	Buffers	PLA Ch. 19.1		Ch. 19.1
June 13	Buffer capacity and preparation; Strong acid/strong base titration curve	PLA Ch. 19.2(1)	HW Ch. 19.1	Ch. 19.1-2
June 14	Weak acid/strong base; weak acid/weak base, polyprotic acids	PLA Ch. 19.2(2)	HW Ch. 19.2	Ch. 19.2



June 16	Equilibria of slightly soluble ionic compounds, $K_{sp}$	PLA Ch. 19.3(1)		Ch. 19.3
June 19	<b>HOLIDAY</b>			
June 20	Predicting ppt formation, selective ppt	PLA Ch. 19.3(2)	HW Ch. 19.3	Ch. 19.3
June 21	Equilibria involving complex ions	PLA Ch. 19.4		Ch. 19.4
<b>June 21</b>	<b>Exam 2 (ch 18 -19)</b>			
June 23	Office hours only			
<b>June 26-30</b>	<b>Summer Break</b>			
July 3	Thermodynamics; 2 <sup>nd</sup> law, entropy	PLA ch 20.1		Ch 20.1
July 4	<b>HOLIDAY</b>			
July 5	Calculating the change in entropy	PLA ch 20.2	HW ch 20.1/2	Ch 20.2
July 7	Entropy, free energy, and work	PLA ch 20.3	HW ch 20.3	Ch 20.3
July 10	Free energy, equilibrium, and reaction directions	PLA ch 20.4	HW ch 20.4, HW Ch 20 all	Ch 20.4
July 11	Electrochemistry; balancing redox reactions	PLA ch 21.1	HW Ch 21(1)	Ch 21.1
July 12	Voltaic cells, cell construction and operation, notation	PLA ch 21.2	HW Ch 21(2)	Ch 21.2
July 14	Voltaic cell potential, $E^\circ$	PLA ch 21.3		Ch 21.3
July 17	Free energy and electrical work	PLA ch 21.4	HW Ch 21.4, HW Ch 21.4(2)	Ch 21.4
July 18	Electrolytic cells, energy to drive nonspontaneous rxn	PLA ch 21.7	HW Ch 21.7, HW Ch 21.7(2)	Ch 21.7
July 19	Batteries, primary, secondary, fuel cells, corrosion	PLA ch 21.5/6		Ch 21.5-6
July 21	Review of ch 20 and 21			
<b>July 24</b>	<b>Exam 3 ch 20 and 21</b>			
July 24	Transition elements; properties of transition elements and inner elements	PLA Ch. 23.1/2/3	HW Ch. 23.1/2/3	Ch. 23.1-3
July 25	Coordination compounds, formulas, and names	PLA Ch. 23.3	HW Ch. 23.3	Ch. 23.3
July 26	Crystal field theory	PLA Ch. 23.4	HW Ch. 23.4	Ch. 23.4
July 28	Nuclear reactions; radioactive decay and nuclear stability	PLA 24.1	HW ch 24.1/2	Ch 24.1
July 31	The Kinetics of radioactive decay	PLA 24.2	HW ch 24.2	Ch. 24.2
Aug. 1	Ionization, application of radioisotopes,	PLA 24.3/4/5		Ch 24.3-5
Aug. 2	The Interconversion of mass and energy; Application of fission and fusion	PLA 24.6/7	HW ch 24 all	Ch. 24.6/7

Aug. 4	Review of ch 20 and 21			
Aug. 7	Review of all chapters			
Aug. 9	<b>Final cumulative exam</b>			

\*The topics that will be covered from each chapter will be selective and announced in class.

**Holidays (no classes):** Monday, May 29 (Memorial Day); June 19 (Juneteenth), June 26 – 30 Summer Break; Tuesday, July 4 (Independence Day)

**GENERAL EDUCATION REQUIREMENTS:** This course satisfies the general education program requirements for the physical sciences at the University of Florida. More information regarding the program objectives, student learning outcomes, and specific goals for CHM2045/CHM2046 can be found in the [General Education Program Requirements](#) document found on Canvas.

**CRITICAL THINKING:** Critical thinking skills are essential in the general chemistry course. There are six criteria by which we promote critical thinking: 1. Information acquisition: Identifying and differentiating questions, problems, and arguments. 2. Application: Assessing the suitability of various methods of reasoning and confirmation when approaching a problem. Students are taught to develop hypotheses and to find support and limitations associated with their hypotheses. 3. Analysis: Identifying and analyzing stated and unstated assumptions and using logical reasoning to evaluate different viewpoints. 4. Synthesis: Students are encouraged to formulate questions and problems, construct arguments to address such questions and be able to effectively communicate conclusions. 5. Communication: In discussion of alternative points of view, students will be encouraged to criticize or defend their arguments with the use of logical reasoning and evidence. 6. Evaluation: Assessing the quality of evidence and reasoning to draw reasonable conclusions.

**MATHEMATICS:** It is crucial in the general chemistry course to be competent in mathematics. Listed are the criteria by which we promote understanding and application of math: 1. Information acquisition: Students learn to select data that is pertinent to solving a problem. 2. Application: Use of algebraic, geometric, and statistical reasoning to solve problems. 3. Analysis: Interpret and draw conclusions from formulas, graphs, and tables. 4. Synthesis: To associate patterns and observations to more abstract principles and to consider specific applications of such principles. 5. Communication: Communicating information symbolically, graphically, numerically, and verbally. 6. Evaluation: Estimate and verify solutions to mathematical problems to determine reasonableness, compare alternatives and select optimal results and understand the limitations of mathematical and statistical methods.

**COLLEGE CHEMISTRY STUDY TIPS:** Success in college-level chemistry primarily requires two things: A strong conceptual understanding of the material, and a competent mastery of quantitative problem-solving strategies that are required to successfully answer word problems that are typical on exams. This means that you must read your textbook and PowerPoint slides and understand them. Then you **MUST PRACTICE** problems in your textbook and on Canvas so that you can diagnose your own strengths and weaknesses with the material. The more practice with problems that you do, the more likely you will recognize and know how to approach different kinds of problems, even if you have never seen identical questions before. Use the following suggestions as a guide:

1. Attempt each of the end-of-chapter problems one at a time, then check their solutions.
2. If you succeeded in getting the correct answer the first time without looking at the solution, check off that problem in the book, and if you did not succeed in getting the correct answer the first time without looking at the solution, circle the problem number.
3. Re- attempt the circled problems the next day or a few days later to see if you get the correct answer without looking at the solution.
4. Repeat steps 2 and 3 if necessary. Never assume that you have understood or succeeded at a problem until you have obtained the CORRECT answer all on your own and NEVER merely look at the solutions and say, "oh yeah, I see what I did wrong", and move on.

Merely "doing all the problems at the end of the chapters" does not equal "doing all the problems at the end of the chapters correctly". The aim is not only to work hard, but to also work productively.

Giving yourself a "grade" after each session will keep you mentally on track regarding how you are performing at that time.

**ADDITIONAL STUDY HABITS:** Any Chemistry course demands a regular sustained effort throughout the semester. This course requires on average 6 – 8 hours per week of work outside of lectures. You are expected to read the appropriate pages from the textbook (or similar chapters in other textbooks) prior to coming to class. The instructor will build on this material, and you are expected to be able to follow in-class discussion. Mastering this course is primarily your responsibility and I am here to help you at all times in your endeavor to be successful. One of the most important things that you should learn while in college is that you must learn to identify your own weaknesses and strengths with the material in your courses and work on those weaknesses by displaying a sense of responsibility for your own learning.

Most importantly, do not allow yourself to fall behind because the material builds up. If you find that you are not grasping essential material by reading the textbook and following in-class discussion, seek help early! Visit your instructor's office hours, talk to other students in your class, compare notes, form a study group, practice as many problems as you can, consult other textbooks, go to the CLC (grad TAs zoom office hours), *etc.*

Cramming overnight will not guarantee a favorable result.

**Disclaimer:** This syllabus represents our current plans and objectives. If those need to change as the semester progresses, then the changes will be communicated to the class clearly via announcements on Canvas.