

FALL 2021 Fundamentals of Chemistry II (4 credit hours)

CHEM 120 SEC. 501-524

Lecture Times: T, R 12:45 to 2:00 for sec 501 – 512 OR T, R 3:55 to 5:10 PM for sec 513 - 524

Lecture Room: ILCB 226

Instructor: Dr. Vickie M. Williamson **E-Mail:** williamson@tamu.edu

Please put "Chem 120" in the subject line or your message goes to junk!

Office Hours: (access this Zoom link on Canvas) 3-4 on M, or 2:30-3:30 on T, or 1:30-3:00 on W, or 10-11 on R, or by appointment. (note: you will need to log into TAMU to access)

Instructors' Assistant: Connor Allen **E-Mail:** coal760@tamu.edu

Supplemental Instruction Leader: Maria Machon **E-Mail:** maria.machon@tamu.edu

Lab Coordinator: Dr. Edward Lee **E-Mail:** EDLEE@tamu.edu

Dr. Abigael Songok **E-Mail:** _____

Laboratory TA: _____ **TA E-Mail:** _____

Welcome to **CHEM 120**. As the science that describes matter, chemistry is central to our understanding of many fields from health to the environment to the evaluation of materials. Rapid new developments in very diverse areas virtually guarantee that chemistry will become even more important in the years to come. Knowledge of chemistry will surely be a vital ingredient in your liberal arts education and an essential foundation for your technical education. As educated citizens, it is likely that it will be important for you to be able to understand, interpret, and evaluate information that involves the molecular world. Check with your advisor if you have any doubts concerning the suitability of this course for your degree.

CHEM 119 and 120 are the first-year chemistry sequence in the core curriculum. These are 4-credit courses that contain both lecture and laboratory portions. This section is a part of a much larger program. Those of us in the First Year Chemistry Program and the Chemistry Department at Texas A&M University are committed to providing a meaningful and stimulating course. Each section of this course is independent of the other instructors' sections, but we strive to cover common content, etc. This handout outlines the course policies for my sections. Other instructors' policies may differ slightly. You should read this material carefully to familiarize yourself with the various rules and procedures, especially those that govern examinations and grades. The objectives of this course are to develop your:

- (1) problem-solving skills and critical thinking abilities,
- (2) knowledge of general concepts in chemistry,
- (3) understanding of chemical terminology used in society,
- (4) ability to perform basic chemistry calculations,
- (5) appreciation of the importance of chemistry in society, and
- (6) positive attitudes towards chemistry.

Specific learning objectives (what you should be able to do) are later in this syllabus. I expect you to have the following prerequisites:

- (1) basic math and chemistry skills,
- (2) curiosity about the world around you
- (3) willingness to learn (even though your friends say chemistry is yucky)
- (4) commitment to do all components (Chemistry "builds" on itself, thus you are lost if you miss earlier steps)
- (5) commitment for regular study (starting the first day!) **6-10 hours per week** is average for studying and problem solving, preferably some time every day. NOTE: We will MOVE FAST!

A calendar is attached, which contains exam dates, reading assignments, and a schedule for lecture & lab.. In the First Year Chemistry Program, we try to make ourselves approachable. Feel free to contact me whenever you have a question on the lecture portion, which is $\frac{3}{4}$ of the total course. If you have questions on the laboratory portion, contact your TA for specific experiments, chemfyp@chem.tamu.edu for general, non-technical issues or Dr. Lee. I look forward to a good semester. Vickie M. Williamson 8/26/21

PHILOSOPHY BEHIND MY TEACHING

The philosophy of how students learn that is held by an instructor should directly impact his/her philosophy of teaching. As a teacher, my job is to facilitate student learning. As a chemical education researcher, my job is to investigate strategies that improve student learning. I believe that learning is an active process in which the individual builds or constructs meaning from experiences and events, which must be integrated into their existing conceptual frameworks. This is constructivism to some, but I had rather explain my philosophy than to use a “buzz word” that might convey misconceptions. I believe that students learn best from direct experience, when they are active in the educational process. At primary grades, direct experience with concrete objects is required. As we mature, this direct experience can take more abstract forms. Methods to actively involve students can be incorporated even into a large lecture class. These include the use of questioning skills, 'wait time', analogy, visual aids, practice, the type of problems assigned, etc. Equally important to the process is drawing meaning from this direct experience through discussion and reflection. Last is the integration of the new idea or meaning with our existing understandings. These ideas are well-represented by a learning cycle approach, in which students gather data about a phenomenon, draw generalizations, and apply or extend the generalizations in other contexts.

COURSE DESCRIPTION: From the undergrad catalogue: Theory and applications of oxidation-reductions systems; thermodynamics and kinetics; complex equilibria and solubility product; nuclear chemistry; descriptive inorganic and organic chemistry; introduction to analytical and synthetic methods and to quantitative techniques to both inorganic and organic compounds with emphasis on an investigative approach.

COURSE PREREQUISITES: CHEM 119 or CHEM 107 and CHEM 117

COURSE LEARNING OUTCOMES: Students will be able to describe the theory and perform calculations for topics specified in the course description. Specific learning objectives are listed at the end of the lecture policies.

COURSE POLICIES (as of 8/26/21)

REQUIRED MATERIALS:

Lecture Materials:

- (1) The Textbook and homework are combined. We are using the **1st edition of General Chemistry: Atoms First by Young, Vining, Day, and Botch**. The bundle can be purchased from http://www.owlv2.com/tamu_fa21.html at a special price for TAMU. At this website, first scroll down to find our section and click the ‘register’ button. Here is a movie of how to register: <https://www.screencast.com/t/QSdf4UCovjI> After registering go back to http://www.owlv2.com/tamu_fa21.html and click on purchase by our section. I would recommend that you **RETURN WHAT YOU HAVE IF YOU PAID MORE THAN \$65 FOR IT!** If you just register in the course, you will have a 14-day free trial. There will also be a virtual Homework help desk to give you help with purchasing and /or registering during the first week or so of the semester. I will publish the hours for this on the homepage. **NOTE: THE ISBNs GIVEN ABOVE ARE FOR THE BOOKSTORE, THE CHEAPER ONLINE VERSIONS HAVE SLIGHTLY DIFFERENT NUMBERS, BUT ARE THE SAME.** Your purchase options include:
 - (a) For Chem 120 only, you can choose:
 - the electronic version only with no hard copy version for 6 months, and it is \$45 ISBN13-978-1-337-62198-4.
 - or a **6-month** access with a loose-leaf hard copy of the text for \$65 ISBN13-978-1-337-81151-4 note that this is the epack!
 - (b) **The best option if you are taking another course that uses a Cengage book** might be to purchase Cengage Unlimited for the semester. With this option, for \$119.99 per semester you get access to all of digital materials (online textbooks, homework, etc.) for as many courses as you have that use Cengage materials. There is also options to rent or purchase hardcopy versions of the textbooks.
- (2) Non-programable calculator. Calculators may not have alphabetic memory. Students **cannot** use calculators that are programmable or have alpha-numeric capabilities for the exams. This means no

TI-eighty anything. You want a scientific calculator under \$15-20. You can check to see if the keystroke is what you prefer by hitting the log key prior to purchase. Some calculators require you to put in the number first then hit log; these will give an error if you only hit the log button. Others require that you hit the log button then the number, similar to the TI-80 series. Check with me if you have any questions. **Any student attempting to use an unacceptable calculator, smart watch, cell phone, or any other electronic device will receive a zero for the exam or activity plus other penalties.**

- (3) You will need iClicker Reef Web App for your laptop, tablet, iPhone or Android device(6-months for \$17.35 at the bookstore OR for \$15.99 from iclicker website: <https://www.iclicker.com/pricing#student-pricing>) Be sure to use your TAMU ID number without any spaces or dashes. You will need to use it once in class to complete your registration.
- (4) You will need access to a laptop computer or tablet with wifi access that you can bring to class to complete your exams on exam day.

Lab Materials:

- (5) Composition or spiral-bound notebook for recording lab data.
- (6) Hayden-McNeil Online. Instructions provided in first lab session.
- (7) Approved eye protection: Chemical splash goggles (fully enclosing goggles with four indirect vents) are required. These are the **ONLY** approved form of eye protection. **No other goggles will be allowed.**

COURSE DESIGN:

All meetings and course materials are structured in a face-to-face format. Both Lecture and lab video material will supplement the interactive meetings.

For Lecture: Interactive problem-solving sessions will occur during the normal lecture time throughout the semester. Prior to each problem-solving session, there will be video lecture material that you are required to watch, while filling in the pdf for the lecture topic. You should begin the homework over those topics prior to the problem-solving session. Hopefully, you will easily get all of the easier questions completed and will have, at least, seen the more difficult questions. During the problem-solving session, we will work the most difficult homework problems via direct instruction, group work, and clicker questions, so you can easily finish up the homework after the session, but before the due date.

For Lab: Interactive laboratory meetings will occur on your scheduled laboratory day/time. There will also be pre- and post-lab videos to watch each week. The videos consist of course content material necessary for the problem-solving sessions and lab activities/assignments. The expectation is that students will watch those videos prior to completing the associated assignments/activities.

More details on these sessions are in the following sections of this syllabus.

ATTENDANCE & PUNCTUALITY:

YOU SHOULD ATTEND ALL LECTURE CLASSES AND LABORTORIES ON TIME.

In the lecture portion, I will not be taking attendance as such; however, to encourage you to attend class, as there will be clicker points daily and could be periodic in-class assignments that will account for part of your lecture grade (See grades below). Arrive to class on time. If you arrive late to lecture, you will be responsible for any material covered before your arrival. If you miss a lecture, you are responsible for both notifying the Lecture Instructor and all material covered during the missed class period.

For the lab, you will begin the experiment promptly at the start of the lab sessions. If you arrive late to your lab session, you will need to request an unexcused makeup lab, which may or may not be permitted. All absences from lab must be reported to and processed by the First Year Program office at makeup@chem.tamu.edu in order to request a make-up lab. Your TA does not have the authority to approve a request for a make-up lab or to schedule a make-up experiment.

An absence for a non-acute medical service, such as a routine doctor's appointment, does not constitute an excused absence. We are under no obligation to allow make-up opportunities for unexcused

absences. All students with University-approved excused absences may request to schedule a make-up. The student is responsible for providing documentation substantiating the reason for the absence. See Student Rule #7 (<http://student-rules.tamu.edu/rule07>) for further guidance.

COPYRIGHT:

The handouts used in this course are copyrighted. By “handouts,” I mean all materials generated for this class, which include but are not limited to syllabi, quizzes, exams, study sheets, in-class materials, review sheets, and additional problem sets, notes, etc. Because these materials are copyrighted, you do not have the right to copy the handouts, unless I expressly grant permission for the lecture materials. For handouts from Lab, you need the permission of the First Year Chemistry Program Office. Tutors and Tutoring services are expressly forbidden from copying any or all of these materials.

ACADEMIC INTERITY STATEMENT and POLICY:

“An Aggie does not lie, cheat or steal, or tolerate those who do.”

“Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one’s work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case” ([Section 20.1.2.3, Student Rule 20](#)).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at aggiehonor.tamu.edu.

Students are expected to be the sole source for any work submitted in their name. The utilization or submission of work of others is a violation of Texas A&M University scholastic dishonesty policies and disciplinary steps will be taken. Only **authorized** electronic or printed materials or equipment may be used in or near the classroom. As commonly defined, plagiarism consists of passing off as one’s own the ideas, words, writings, etc., which belong to another. **In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of that person or if you do the work but represent it as someone else’s (like using another student’s clicker).** Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research and knowledge cannot be safely communicated. Academic dishonesty will not be tolerated in any form and will be reported to the proper university officials. Expulsion for academic dishonesty does not look good on one’s permanent record and is not worth the points you are trying to gain by cheating. If you have questions regarding plagiarism, please consult the latest issue of the *Texas A&M University Student Rules*, under the section “Scholastic Dishonesty.”

Unauthorized collaboration via text messages, social media (Facebook, GroupMe, etc.), or any other means of passing or receiving information about exams or any other graded material are all considered honor violations.

Even though laboratory data is collected in pairs all submitted work must be completed individually. Each student has to turn in their own pre-lab, post-lab, and data sheets. Copying entire or portions of prelab, post-lab, and data sheets instead of turning in your own original work is considered cheating. Allowing others to view your work is also cheating. Turning in a post-lab and data sheets for a lab you did not complete is also considered cheating. Changing experimental data after leaving lab, making up or borrowing data that you did not obtain in class is also a violation of the honor code.

Reports of academic dishonesty will be filed for those who fail to follow the code. All honor violations will be reported to the Aggie Honor System Office.

AMERICANS WITH DISABILITIES ACT (ADA) POLICY:

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit <http://disability.tamu.edu>. Disabilities may include, but are not limited to attentional, learning,

mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Disabilities can be either temporary (e.g. broken arm) or permanent (e.g. a learning disability). If you have any questions, see me. Students wishing to receive accommodations for disabilities for the course must submit the appropriate paperwork to **both** williamson@tamu.edu and chemfyp@chem.tamu.edu. We are not responsible for providing any accommodations until after the appropriate paperwork has been submitted.

TITLE IX AND STATEMENT ON LIMITS TO CONFIDENTIALITY:

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see [University Rule 08.01.01.M1](#)):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, you will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with [Counseling and Psychological Services](#) (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's [Title IX webpage](#).

STATEMENT ON MENTAL HEALTH AND WELLNESS:

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall wellbeing. Students are encouraged to engage in proper self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at suicidepreventionlifeline.org.

COVID STATEMENT

To help protect Aggieland and stop the spread of COVID-19, Texas A&M University urges students to be vaccinated and to wear masks in classrooms and all other academic facilities on campus, including labs. Doing so exemplifies the Aggie Core Values of respect, leadership, integrity, and selfless service by putting community concerns above individual preferences. COVID-19 vaccines and masking — regardless of vaccination status — have been shown to be safe and effective at reducing spread to others, infection, hospitalization, and death.

There are faculty, staff and students on campus who are more highly vulnerable to COVID than many of you are. I'm asking you to please wear masks in this class in deference to them and my family member who is immunocompromised. I very much appreciate your help in keeping the Aggie family well and my family safe during a challenging time.

Personal Illness And Quarantine

Students required to quarantine must participate in courses and course-related activities remotely and **must not attend face-to-face course activities**. Students should notify their instructors of the quarantine requirement. Students under quarantine are expected to participate in courses and complete graded work unless they have symptoms that are too severe to participate in course activities.

Students experiencing personal injury or Illness that is too severe for the student to attend class qualify for an excused absence (See [Student Rule 7, Section 7.2.2.](#)) To receive an excused absence, students must comply with the documentation and notification guidelines outlined in Student Rule 7. While Student Rule 7, Section 7.3.2.1, indicates a medical confirmation note from the student's medical provider is preferred.

GRADE COURSE CALCULATIONS:

Grades will be calculated on a point basis. Explanations of each source of points are detailed in the Lecture Policies or Lab Policies sections.

Lecture Points Possible:

Clicker/Polling (only 70% of clicker pts required)	30
Tasks (best 5 of 7 @ 5 points each)	25
Homework (7 @ 15 pts each)	105
Chapter Mini-Exams (for chp 10, 20, 14-19,21 @ 10 pts each)	90
Exams (4 @ 100 points each)*	400
Comprehensive Final	100
Total points from Lecture	750

Laboratory Points Possible:

250

TOTAL POINTS for the Course

1000

*At the end of the semester, the **lowest of the four regular exams will be dropped and replaced** by your percentage on the final exam (if it is higher).

Final Grade Cut-Off:

A	1000 - 900
B	899 - 800
C	799 - 700
D	699- 600
F	599-- 0

You can be assured of the letter grade that is indicated if you fall in the above ranges. The final grade cut-off may be slightly lowered at the end of the semester. **Each semester's ranges and each lecture sections' ranges are independent of each other.**

Students missing only a **small portion** of the course will receive a grade of "I" (Incomplete) if they request this grade and meet the University criteria for this temporary grade.

CHEMISTRY 120 LECTURE POLICIES

Lecture Learning Objectives:

See the list at the end of this document. These are the skills that you should be able to do after all of your study. These learning objectives drive the coverage of the content and the exams. The exact coverage for each exam will be given in class.

Lecture Schedule:

Lectures are designed to help you to develop an understanding of the material being covered. There is a tentative schedule at the end of this syllabus. Topics and chapter/unit references are subject to

change. **ANY schedule changes or other announcements will be given at the beginning of the class and posted on our homepage** (see the web address below). Tentative chapters/units are shown in the Calendar and specific assignments given in class and on the homepage.

YOUR LECTURE GRADES:

PLEASE KEEP A RECORD OF YOUR LECTURE POINTS BELOW.

Tasks: Points Received:	Homework: Points Received:
#1	#1
#2	#2
#3	#3
#4	#4
#5	#5
#6	#6
#7	#7
Best 5:	Total:

Chpt Mini Exam: Pts Received:	Chpt Mini Exam: Pts Received	Exams: Points Received
#1	#6	#1
#2	#7	#2
#3	#8	#3
#4	#9	#4
#5	Total:	FINAL:

All grades for Lecture will be displayed on canvas.

Clicker/Polling/Participation:

During the semester, you answer will questions during lecture time. These will be designed to be similar to your homework, so as to help you do the homework in less time. Clicker questions will be done both individually and in groups during class. Some may be quiz-like, in that there is a 'correct' answer, others may be opinion based. I DO NOT expect you to get these all correct, so I only require 70% of the points for FULL course credit. **There are NO makeup clicker assignments**, as the lower percent required should take care of necessary absences, forgotten clickers (have your clicker for each class session), or bad batteries. We will use clickers from the first day, but the points will count in about a week.

Clicker points will be posted for each day during the first few days, even when the points are not counting, so you can be sure your clicker is working, then posted weekly. **You only have 2 weeks to notify me if you believe there is an error in your Clicker points.** Clickers have two purposes: 1) to set deadlines to encourage you to keep up, and 2) to give me an idea of your understanding of the concepts. Clicker points will be transformed into course points at the end of the semester using this scheme:

Percentage of Clicker Points	15-19%	20-25%	25-29%	30-34%	35-39%	40-44%	45-49%	50-54%	55-59%	60-64%	65-69%	≥
Number added to your course points	8	10	12	14	16	18	20	22	24	26	28	30

Tasks:

During the semester, you will have tasks during the semester. Each task will be worth 5 course points. The **best 5 tasks** will count. There will be **at least 7 tasks** totally. These may be in various formats (written, clicker, on-line, etc.). Some may be UNANNOUNCED in class quizzes; others will be on-line. **There are no make-ups for in-class tasks**; if you miss one, it will be one you drop. **On-line and out-of-class tasks can have their due date extended for university-approved absences.** Tasks may be taken from the assigned problems, demonstrations, material covered in lecture, etc.

Lecture Reading Assignments:

With the MindTap homework system, the homework is embedded in the textbook in a single screen. You should read the short passages of text before attempting the homework.

Lecture Homework Sets:

Homework problems will be assigned for each topic of study in MindTap. **Homework will be due in about 1-2 days from the class problem solving session.** Homework will be assigned a grade about every 2 weeks and will be called a homework set. **Each set of the seven homework sets will contain assignments for about two weeks of class.** Homework sets are worth 15 course points and the seven together will be worth 105 course points for the semester. Homework **MUST** be turned in on time. The purpose of homework is to prepare you for exams. Additional details are on the schedule, the homepage, in emails, etc.

Percentage of instructional units correctly completed and turned in on time for each of the 7 sets	<20%	20-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-89%	90-94%	≥95%
Number added to your course points	0	7	8	9	10	11	12	13	14	15

Lecture Chapter Mini-Exams:

For the nine major chapters covered in the course (10, 12, 14-19, 21), you will be asked to complete a mini-exam AFTER finishing all of the homework for that chapter. The mini-exam will be a chapter review in MindTap, where you only have two tries and are not given any feedback on the question, other than the correctness of your response. This will prepare you for the Lecture Exam. A total of 10 points will be awarded for each Mini-Exam, resulting in a possible 90 course points. For most of the Mini-Exams, you will be asked to earn a set number of points (For example: Earn 20 of the possible 23 points for the 10 course points.) You should consider these as sample exams.

Lecture Exams and Final:

There will be 4 lecture exams (Exams 1, 2, 3 and 4) given on the days indicated on the Calendar. Additionally, there will be a Final Exam. These exams may be all multiple-choice or all short answer or include combination of multiple-choice questions and non-multiple choice questions.

- (1) **Lecture Exams:** These are online assessments that will be timed exams online, with short open window during our class time. The exams will have a set amount of time once you begin.. These exams are worth 100 points. Exam 2-4 may include previously covered material. More about exams will be in in class emails. Exam policy could change.
- (2) **Final Lecture Exam:** The Final Exam will be a COMPREHENSIVE exam covering all the chapters taught during the semester and is worth 100 points. The score on the final counts as the final AND can replace the score on Exams 1-4, IF it is higher. The final is scheduled for **Tuesday, Dec. 14, 2021 from 1:00PM-3:00 PM for the 3:55 lecture and Wednesday, Dec. 15, 2021 from 8:00AM-10:00 AM for the 12:45 lecture. Please do not expect to take the final exam at any time other than the scheduled time FOR YOUR-SECTION**, unless you have made arrangements with me.
- (3) **Make-up Lecture Exam:** For students who have **university-excused absences (or very good ones)** and who also notify me (the instructor) **within 2 academic days** (M, T, W, R, & F) after

the class exam, a make-up test will be arranged. **I require a written documentation for the excused absence. Illness must have a confirmation from a health care professional.** The make-up exams will be at least as difficult as the regular exams. The time for the makeup exam will be set after the 2-day signup period, from student schedules. Makeup exams are scheduled within a week of the regular exam. Makeup exams cover the same material and learning objectives.

Lecture Exam Administration: (as of 8/26/21)

- (1) Check the exam seating assignment on Canvas one day in advance. **Each exam has a different seating assignment. For special seating requests** such as a left-handed seat or a table sign up at the beginning of the semester on forms I bring to class or go to room 412 HELD. You only need to turn in one request for the semester
- (2) Arrive at the exam on time. Plan to visit the bathroom prior to the exam. Cheating or bringing in material with intent to cheat will result in a zero for the exam or a more severe penalty.
- (3) Bring an approved calculator. There must be **NO** "sharing" of calculators during an exam. Students **cannot use** calculators that are programmable or have alpha-numeric capabilities for the exams. This means no TI-eighty anything. You want a scientific calculator under \$15. You can check to see if the keystroke is what you prefer by hitting the log key prior to purchase. Check with me if you have any questions. **Any student attempting to use an unacceptable calculator, smart watch, cell phone, or any other electronic device will receive a zero for the exam plus other penalties**
- (4) Bring to the exam a PHOTO I.D. (your TAMU I.D. card OR a DRIVER's License will work). Have a pen/pencil, paper, approved calculator, plus any other approved items ready. Any other items must be "enclosed" out of sight in a briefcase, pack, purse, or sack, **and stored under your assigned seat**. Make sure your computer charged up and ready to go. There are power outlets under your seat, so remember your charging cord, just in case.
- (5) Exams will be administered online via your Cengage interface. This should be the **ONLY** website open! Having other websites open will result in a zero on the exam. When you get to the exam room, get your computer going and log into your Cengage account to the "My Home" page. Close all other tabs.
- (6) During the Exam: **keep all work covered** as much as possible. Talking or looking around the room will result in a withheld grade for the exam

Once the class is logged into Cengage, the password for your exam will be given. You have a **set number of minutes** to complete the exam from the time you open it. You will be automatically logged out when your time is up. You will only have 1 submission.
- (7) If your connection goes out during the exam or you accidentally close your browser, don't panic. Simply log back in and resume the exam where you left off. If you have a technical issue during the exam such as a major computer crash, raise your hand to contact me. Technical issues do not guarantee a retake, this might be the exam your final replaces.
- (8) Scores will be released first (usually by the next day), then later your work, the solutions and all of the feedback will be available for you to review. If you believe that your exam is misgraded, contact me.
- (9) As you study for the exam, consider developing a 1-page summary of things to know for this exam. You can create this as you are doing the homework and reviews for the chapters covered on the exams. It will help by giving you a concise set of information for each chapter.

Lecture Content Review:

A Content Review Session will be posted on line for the content for each exam. You will have **two sets of sample questions** for each of the 4 lecture exams. There will also be sample questions on the new material from the day of lecture not covered on exam 4, which will be new for the final. These

content reviews will be in the form of pdf files and screencasts that you can play over as needed with Quicktime, Windows Media Player, on a computer, an ipod/ipad, or on a tablet. All links will be on ecampus. I will also hold additional office hours near the exams for extra questions.

Social Media for Lecture:

For the class Groupme: Signup to be emailed to you by our IA.

Course Info Via The Web At Williamson's 119/120 Homepage:

While Canvas will have your grades displayed and some activities or announcements. You can find the latest news, objective list, frequently asked questions, etc. on my personal webpages. (<http://chemed.tamu.edu/chem120/>). **BOOKMARK AND CHECK THIS SITE FREQUENTLY.** Special announcements and schedule changes will be announced at the beginning of the lectures and posted on this homepage. You will need a password to get to the protected part of the homepage. This will be given in class.

Help:

You can do these things to improve your lecture grade:

- (1) Attend **all class periods**.
- (2) **Keep up** with your assigned **reading / homework problems**.
- (3) Come to class **prepared** having watched the content videos, filled out the student powerpoint, and reviewed the homework questions on these topics (ask questions if you don't understand).
- (4) Take **all tests, assignments, homework, and assignments**.
- (5) See me during **office hours or make an appointment** with me to discuss anything you don't understand or can't work.
- (6) Attend **SI**.
- (7) See the **TA helpdesk** (but choose a time in the middle of a lab time). The lab TA's can help with both lab and lecture questions. These are in room 215 HELD from 8-5 M-F and on zoom at: <https://tamu.zoom.us/j/95602304317> Passcode: fyphelp
- (8) As a last resort, engage a **tutor** for hire. Tutors who can give you individualized help are best. I have a list of individual tutors for hire.
- (9) Follow **Williamson's Study Rules**

Williamson's Study Rules:

- (1) **The 15-minute rule**
Don't spend over 15 minutes on any one problem unless you are making progress. Seek help, you are missing a point, and you don't want to become frustrated.
- (2) **The 2-lecture rule**
Don't let any more than 2 lectures pass when you don't understand something. Seek help. (This rule means that if you attend one lecture and a topic is fuzzy, go home, read about it, and try problems, remembering the 15-minute rule. Go to the 2nd lecture. If all is not clear by the second lecture, seek help.)
- (3) **Order of Study Rule**
 - Hear the lecture
 - Read the text and try the practice problems from the book (remember the 2 rules above).
 - Consider rewriting your notes to better organize the material. Write what is the important information from each slide in the ppt.
 - Do assigned homework.
 - As an exam nears, revisit the chapter reviews on MindTap and the content reviews that are our protected homepage. Take at least one of them under 'exam conditions' (set the timer, use only the tables and equations that will be on the exam).
- (4) **After an Exam Rule**
 - First you will be able to get your exam score.
 - A bit later, Ck the class average (compare your score to the average)
 - When available, do a detailed review of your exam before the next exam by checking your response to the feedback. Then go through these steps:
 - 1) Can you work it now, easily getting the correct answer? Practice till you can.
 - 2) Are you missing word or math questions? Do a talley of the ones you missed.

- 3) Why did you miss each question in the first place? Look for patterns so you can correct this error for the next exam (the same reason why you missed multiple questions). In the past students have told me that possible patterns are:
- Misreading the problem. The problem asked for least electronegative, and the student answered it for most electronegative. In this case, marking the exam question with circles, boxes, etc. to help focus on the question BEFORE reading the possible answers will help.
 - Choosing the wrong equation or method to use. In this case you need practice planning your problem solving strategy. Go to homework or sample exam problems you have already done. Reread the problem and make a plan for solving it. Then ck your plan by looking at your previous work. Do NOT simply recalculate the problem. Don't use a calculator to practice planning.
 - Missing a relationship between variables. This may be a conceptual type problem. You missed it because you didn't know the trends, etc. You can help this by using the objective list to write out every relationship. For example, if the objective says to ID the trend in electronegativity, you could write out on an index card the relationship between position in the periodic table and electronegativity (electronegativity increases as you go up a family and across a period, with F being the most electronegative).
 - Miscalculation: You read the problem correctly; you chose the correct equation, but you got the wrong answer. In this case you need practice with your calculator. Go to the sample problems in the textbook, find the place where all values have been substituted in, and use your calculator until you can get the same number solution.

TENTATIVE LECTURE SCHEDULE
Chem 120 Fall 2021 -----Dr. V.M. Williamson

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
8/29	8/30	8/31	9/1	9/2	9/3
		INTRO/SYLLABUS CHAPTER 10 review, CHAPTER 20 Chemical Thermodynamics		CHAPTER 10/20 Chemical Thermodynamics	<i>*Last day to add/drop courses</i>
9/5	9/6	9/7	9/8	9/9	9/10
		CHAPTER 20 Chemical Thermodynamics		CHAPTER 20 Chemical Thermodynamics	
9/12	9/13	9/14	9/15	9/16	9/17
HWK SET #1 ENDS		CHAPTER 14 Solutions		CHAPTER 14 Solutions	
9/19	9/20	9/21	9/22	9/23	9/24
		CHAPTER 14 Solutions		CHAPTER 15 Kinetics	

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
9/26	9/27	9/28	9/29	9/30	10/1
HWK SET #2 ENDS		***** EXAM 1 *****		CHAPTER 15 Kinetics	
10/3	10/4	10/5	10/6	10/7	10/8
		CHAPTER 15 Kinetics		CHAPTER 15 Kinetics	
10/10	10/11	10/12	10/13	10/14	10/15
HWK SET #3 ENDS		CHAPTER 16 Chemical Equilibrium		CHAPTER 16 Chemical Equilibrium	
10/17	10/18	10/19	10/20	10/21	10/22
	<i>Midterm grades due at noon</i>	***** EXAM 2 *****		CHAPTER 17 Ionic Equilibria: Acids and Bases	

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
10/24	10/25	10/26	10/27	10/28	10/29
HWK SET #4 ENDS		CHAPTER 17 Ionic Equilibria: Acids and Bases		CHAPTER 17 Ionic Equilibria: Acids and Bases	
10/31	11/1	11/2	11/3	11/4	11/5
		CHAPTER 18 Ionic Equilibria: Buffer/Titration		CHAPTER 18 Ionic Equilibria: Buffer/Titration	
11/7	11/8	11/9	11/10	11/11	11/12
HWK SET #5 ENDS		CHAPTER 19 K _{sp} Lewis A/B		***** EXAM 3 *****	
11/14	11/15	11/16	11/17	11/18	11/19
		CHAPTER 21 Electrochemistry		CHAPTER 21 Electrochemistry <i>*Bonfire Remembrance</i>	<i>*Last day to Q-drop</i>

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
11/21	11/22	11/23	11/24	11/26	11/26
HWK SET #6 ENDS		CHAPTER 21 Electrochemistry		Thanksgiving Holiday	Thanksgiving Holiday
11/28	11/29	11/30	12/1	12/2	12/3
		CHAPTER 21 Electrochemistry		***** EXAM 4 *****	
12/5	12/6	12/7	12/8	12/9	12/10
	<i>*Refined Day- Attend Friday Classes</i>	CHAPTER 25 Nuclear <i>*Refined Day- Attend Thursday Classes</i>	<i>*Last Fall Classes</i>	Reading DAY NO CLASSES	<i>*First day of Finals</i>
12/12	12/13	12/14	12/15	12/16	12/17
HWK SET #7 ENDS		FINAL EXAM 3:55 class 1:00-3:00 PM	FINAL EXAM 12:45 class 8:00AM-10:00 AM		<i>Grades due to Registrar by noon on 12/20</i>

WILLIAMSON'S CHEM 120 TENTATIVE LECTURE LEARNING OBJECTIVES

CHEM 120

Dr. Williamson

FALL 2021

You should be successful on exams if you can do the following in addition to the CHEM 101 skills.

THERMODYNAMICS- Chapters 10 & 20 in MindTap

NOTE: Objectives 1-8 from chem. 101-will be quickly reviewed

1. I.D. endothermic & exothermic rxns
2. Define calorie, Calorie, joule. Convert between these units
3. Use 3 of these to calculate the 4th (q, m, s, ΔT)
4. Describe the differences between heat and temperature
5. Predict and calculate changes in internal energy, work, heat
6. Predict ΔH_{rxn} in processes (+, - or ≈ 0)
7. Recognize standard state, standard conditions and state functions
8. Calculate ΔH_{rxn} using:
 - Heating/cooling curves,
 - calorimetry,
 - ΔH_f° ,
 - by combining known ΔH_{rxn} values,
 - by using bond energies, 8.3
 - by proportionality

Unit 10, Sections 1-6

9. Define spontaneity and ID spontaneous processes without calculations
10. Explain why entropy changes with temperature, phase change, etc.
11. Predict ΔS in processes (+, - or ≈ 0)
12. Calculate ΔS using S° values
13. Explain relationship between entropy and enthalpy (Gibbs);
14. Predict ΔG in processes
15. Find the temperature range at which a reaction is spontaneous
16. Calculate ΔG using ΔG_f° of products & reactants and using Gibbs equation; relate this to spontaneity
17. Predict the signs of ΔH , ΔS , and ΔG from observations

Unit 20, Sections 1-3
omit 20.3c and 20.3d

SOLUTIONS -Unit 14, Sections 1-5

1. Define & Calculate M, m, %wt, mole fraction, ppm, N
2. Describe dissolving at the particle level & the characteristics of solutions
3. Describe interactions, energy changes, role of disorder in the solution process
4. Predict if certain compounds will dissolve in specific solvents
5. Describe & calculate the effect of solution concentration on vapor pressure, b.p., f.p., & osmotic pressure of a solution

KINETICS - Unit 15, Sections 1-6

1. Give the rate of reaction in terms of reactant and product concentration variations
2. Calculate aver. rate, given [], [], t_f , and t_i
3. Calculate instantaneous rate from a graph of [] vs. time
4. Explain the factors that affect rxn rates.
5. Explain the meaning of "rate constant" & state the units
6. Determine the rate law and overall order from experimental results (vv)
7. Calculate rate, rate constant, or reactant conc. given rate law + 2 of these
8. Calculate [A], $[A]_0$, k, or t given 3 of 4
9. Explain & calculate relationship between $t_{1/2}$ & k for zero, 1st, and 2nd order rxn
10. Use graphing to determine zero, 1st, or 2nd order
11. Find E_a , ΔE from energy profile & define each
12. Use collision theory to explain temperature & concentration dependence
13. Describe the effects of a catalyst on energy requirements
14. Use the Arrhenius equation to relate activation energy to changing temp. & rate constants
15. ID elementary step, overall rxn, and rate determining step
16. Derive Rate law given elementary steps & their speeds or overall rxn
17. ID a catalyst and an intermediate in a mechanism

EQUILIBRIUM –Unit 16, Sections 1-4

1. Describe chemical equilibrium
2. Describe & Write the equilibrium constant expression for a balanced equation.
3. Calculate K using equilibrium concentrations or pressures (vv)
4. Convert between K_p and K_c
5. Find the equilibrium constant for 1 equation by comparing it to another equation
6. Calculate K given initial concentration and 1 equilibrium concentration
7. Determine if an equilibrium has been reached, conditions at equilibrium, or the direction of the equation.
8. Calculate Q and compare it to a given K to determine the direction of the equil.
9. Use K and initial concentrations to find the equilibrium concentrations
10. Explain how changes in conc, temp, volume, & pressure effect equilibrium
11. Calculate K from ΔG

Unit 19.3c and 19.3d

ACIDS & BASES –Unit 17, Sections 1-3

1. ID general properties of acidic and basic solution and calculate electrolyte ion concentration
2. Describe Arrhenius, Bronsted, and Lewis theories
3. ID and describe weak, strong, and nonelectrolytes
4. ID Bronsted acids, bases, and conjugate acid-base pairs and their strengths
5. Predict the strength of binary and ternary acids
6. Explain what is meant by autoionization of water AND write the ion-product constant
7. ID strong acids and bases and calculate their pH, pOH, $[H^+]$, or $[OH^-]$
8. Describe K_a and K_b ; predict the strength of an acid or a base from K_a or K_b .
9. Use 2 of these to find the 3rd for weak acids and bases: K_a or K_b , pH or pOH, concentration, K_w
10. Calculate % ionization using equil concentration, pH or pOH, & K_a or K_b v.v.
11. Use the relationship between acid strength and K
12. Use the relationship between conjugate acid-base pair strength, K_a/K_b , and K
13. Write the products of acid/base rxns, including net ionic equations
14. Predict & calculate the pH of a salt
15. Predict & calculate the pH of a polyprotic acid.

Buffers & Titrations –Unit 18 Sections 1-4

1. Predict and Calculate the effect of a common ion added to a weak acid or base
2. Describe a buffer solution
3. Calculate the pH or conc. of species in a buffer solution given K (v.v.)
4. Describe & calculate the pH or conc. of species in a buffer solution after the addition of strong a or b
5. Describe the titration curve for SA by SB, WA by SB, and WB by SA
6. Calculate the pH or $[H^+] / [OH^-]$ at any point in an acid-base titration
7. Choose an appropriate indicator for a titration

Slightly Soluble Salts –Unit 19, sections 1-4

1. Give the expression for the solubility-product constant for a slightly soluble salt
2. Calculate K_{sp} from solubility data (vv)
3. Calculate molar solubility
4. Calculate precipitation or the effects of a common ion on solubility

Electrochemistry –Unit 21, sections 1-4

1. Define redox, assign oxidation #'s
2. Balance Redox equations
3. Describe a voltaic cell
4. Calculate E°_{cell} (the cell potential)
5. Predict spontaneous reaction
6. Predict strength of reducing (and oxidizing) agents
7. Describe an electrolytic cell
8. Use Faraday's Law of Electrolysis to calculate amt. of products, current, time, or oxidation state
9. Predict the products of electrolytic cells (molten & aqueous) and of voltaic cells
10. Convert E° to ΔG° & K
11. Use the Nernst equation to calculate E under nonstandard concentration (vv)

Nuclear -Unit 25, sections 1-5

1. Write symbols for electron, protons, neutrons, positrons, alpha particle, gamma ray
2. Complete and balance nuclear equations
3. Predict type of decay via “belt of stability”
4. Calculate $[A]_t$, $[A]_0$, or k given 2 of 3
5. Use $1/2$ life equation
6. Describe how the C-14 dating process works
7. Calculate the binding energy and mass deficiency
8. Describe fusion/fission
9. Describe the hazards of Radon gas.
10. Describe the difference between fission and hydrogen bombs.
11. Give the parts & functions of a nuclear reactor.

CHEMISTRY 120 LABORATORY POLICIES

Lab Safety:

Student safety is a top priority in the Texas A&M Department of Chemistry.

- Protective eyewear, appropriate clothing and shoes that completely cover your feet must be worn at all times in the laboratory. Appropriate clothing includes pants or long skirts which come all the way down to the ankles so that no parts of the legs or feet are exposed and a shirt or top with sleeves.
- All CHEM 120 students accept a Lab Safety Acknowledgement (LSA) in Howdy upon registration.
- Furthermore, students must view a safety video and pass a safety quiz.
- **Any student who does not view the safety video and pass the safety quiz will not be permitted to continue in CHEM 120.**
- The safety guidelines associated with individual experiments are explained in the lab manual and will be presented at the beginning of each experiment.
- Prelab quiz questions regarding safety aspects specific to each experiment should be expected.
- Failure to adhere to any safety regulation while in the laboratory will result in expulsion from the laboratory.
- Eating, drinking, and smoking are prohibited in the lab at all times. Chewing gum or tobacco is also prohibited.
- Long hair must be held in place to the back of your head. You are responsible for bringing the bands or clips to hold back your hair.
- If you do not comply with the attire rules, you will be asked to leave the lab to get appropriate clothing. If you do not make it back to complete the lab, you will receive a zero for that particular lab.
- All personal belongings must be placed in the back of the room and any food/drink should be inside a backpack.

Further details on appropriate lab attire and other safety regulations will be explained during the first class meeting. If you are pregnant or become pregnant during this semester, it is important to speak to a Lab Coordinator so that safety concerns can be discussed.

Communication and Conduct:

All electronic communication with your TA, the FYP office, and the Laboratory Coordinator must be conducted from a *tamu* email account. Emails sent to university email addresses are a permanent document of communication. Therefore, be sure that your emails are polite, professional and well-prepared before you send them. All emails should include the student's first and last name, UIN, and the course and section number. Students are responsible for checking their *tamu* email on a regular basis to receive messages regarding the laboratory course. Please allow up to 48 hours for a response to emails. Responses will normally occur between 8 am and 4 pm, Monday through Friday. Inappropriate language and/or disruptive behavior can result in loss of credit at the discretion of the TA or Laboratory Coordinator and/or reported to the Student Conduct Office.

Accidents and Other Incidents:

Any illness or injury incurred in the laboratory must be brought to the attention of your Teaching Assistant or Laboratory Coordinator. In the event of serious injury, 9-1-1 will be contacted by the Lab Coordinator or Instructor and the situation will be assessed by the responding EMT team. Because students are not eligible for worker's compensation, the cost of any care not provided by the Beutel Health Center must be covered by the student's personal health insurance plan.

Laboratory Assignments:

Assignments associated with 10 laboratory experiments comprise the majority of the lab grade. The points for each experiment are divided into several categories, including: prelab quizzes, laboratory notebooks, safety and performance, data reduction and analysis, smart worksheets, and post-lab questions. A brief description of each of the course components is given below. A schedule of experiments and a point breakdown for all assignments is listed on the last page of this syllabus. These assignments are to be completed independently; all rules and policies regarding the Aggie Honor Code apply to these assignments.

Prelab Quizzes:

A prelab assessment will be administered for each experiment in the course. All of the quizzes for the course are electronic, and will be embedded in the experimental text on Hayden-McNeil Online. The prelab quiz(zes) for each experiment will be due ***at 1 am on the day of the lab meeting*** in which the experiment is scheduled to be performed.

Although use of the laboratory manual and other printed or electronic resources cannot be restricted, **you are required to complete the quizzes individually**. Students should also be aware that successful completion of the quizzes will require adequate preparation.

The prelab quizzes are designed to test a student's preparedness for the upcoming experiment ***and*** their understanding of basic chemical concepts relevant to each experiment. Quiz questions may cover but are not limited to the following topics: basic calculations; experimental aim; ecological/environmental issues; analytical techniques; basic chemical concepts; experimental procedure; data manipulation, and equipment and reagents. At least one general safety question will be included in each quiz.

Laboratory Notebooks:

A basic notebook (composition, spiral-bound, etc.) will be required for students to write experimental procedures, data and observations. The format of the lab notebook will be discussed during the first lab meeting. These lab notebooks will be checked periodically throughout the semester. If you arrive to your lab session without a complete prelab notebook for the experiment, you will need to request an unexcused makeup lab, which may or may not be permitted.

Data Reduction and Analysis (DRA):

The course site provides a series of directions, calculations and questions after each experiment. These exercises are designed to guide students through the analysis of their experimental data. All calculations and questions will be completed on a worksheet found on the course site. Any plots or data tables should be completed using an electronic software package such as Microsoft Excel. Electronic copies of all tables and plots will also be submitted alongside the DRA.

Smart Worksheets:

In place of DRAs for certain experiments, you will complete Smart Worksheets on Hayden-McNeil Online. These Smart Worksheets provide hints for significant figures, magnitudes of values, etc. as you enter in your data and calculated values and are graded as you submit your responses.

Post-Lab Questions:

For certain experiments, post-lab questions will be also be assigned. Students should write their responses in paragraph form, including tables, graphs, equations and calculations when appropriate.

Please Note:

If you experience a technical issue with a Hayden-McNeil assignment, contact the Support Team at <https://macmillan.force.com/macmillanlearning/s/> immediately. Technical difficulties will not be considered an excuse for non-completion, so we encourage you to begin and complete the assignment well before the deadline.

All assignments must be submitted electronically. Physical submissions will not be accepted, nor will they be graded. Successful submission of assignments will be confirmed via email. If you do not receive a confirmation email, you should assume your assignment was not successfully submitted and you should try again.

Assignment Due Dates and Late Policy:

Unless a University-excused absence applies,

- All pre-lab assignments will be due at 1 am the day of your lab meeting
- All post-lab assignments will be due at 1 am one week after your lab meeting.
- If any portion of a post-lab assignment is submitted late, a flat 50% deduction will be applied to all associated post-lab work.
- Assignments submitted more than 24 hours after the deadline will not be graded.

Determination of Laboratory Points:

Student scores from the assignments described above will be summed and the totals will be converted into a score out of 250 points. It is possible that the conversion may vary from section to section. The Laboratory Instructor's policy will attempt to compensate as much as possible for differences in the grading habits of TAs.

Laboratory Schedule for Fall 2021						
Week of	Experiment	Points	Pre-Lab Quizzes	Safety & Performance (S&P)	Post-Lab Assignments	Total Lab Points
			10	10	40	
9/6	Safety*/Lab Notebooks	20				
9/13	Colligative Properties	60				
9/20	Spectrophotometry	60				
9/27	Research Project Week 1	20				
10/4	Research Project Week 2	70			(60)	
10/11	Reaction Kinetics	60				
10/18	Determination of Equilibrium Constants	60				
10/25	Acid-Base Titrations	60				
11/1	Titration Curves	60				
11/8	Analyzing Buffers	60				
11/15	Thermodynamics and Equilibrium	60				
11/29	Lab Practical	60				
	Laboratory Notebooks	30				
	Total					

* Students who miss the safety orientation must make this up BEFORE their next lab meeting.