

CHEMISTRY 112 / S23

Section 011

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CHM 112 is the second course in a two-part sequence to introduce students to the foundational principles of Chemistry. Students in CHM 112 will be exposed to the fundamental laws of mass and energy conservation and their application to chemical systems and reactions. Students will also study the role of energy and entropy in chemical systems and how they manifest themselves in chemical equilibrium. The approach to equilibrium will also be investigated through the study of chemical kinetics. Students in CHM 112 are expected to read at the college level and also set up and solve algebraic and trigonometric equations. As such students must have satisfied the math prerequisites for CHM 111 and made a grade of C or better in CHM 111. Upon completion of this course, a student will demonstrate competence in each of the following areas:

- solving chemical problems,
- understanding chemical concepts from the lecture by successfully applying these concepts on homework and tests,
- making accurate physical and chemical measurements in the laboratory, and
- writing clear and concise laboratory reports.

Class Meeting Times and Locations

Lecture: MWF 1:25 p.m. – 2:15 p.m., GSC 102
Lab: T 9:30 a.m. – 12:15 p.m., GSC Lab 204

Course Materials

Chemistry, 6th ed., Burdge.
Laboratory Notebook
Scientific Calculator (graphing with numerical solver preferred)
Laboratory Instructions (From *CANVAS*)
Approved Safety Glasses/Goggles

Course Structure

Portions from eight chapters of the text will be covered during the semester in the order listed on the class schedule. The lecture time will be used to expound on and augment the text and also discuss problem solving strategies. Students are responsible for all material covered in class as well as the material from the textual sections listed in the class schedule. While homework from the book will not be collected, students are encouraged to complete as many problems as possible to gain competency with the material. Online homework will be assigned and graded. Four 50 minute exams will be given per the schedule. A three hour final exam will be administered at the end of the term.

Grading

Tests (best 3 @ 100 pts)	300 pts
Quizzes (best 8 @ 25 pts)	200 pts
<i>Aktiv</i> Online Homework	100 pts
Laboratory (8 @ 25 pts)	200 pts
Final Exam	200 pts

Total Possible	1000 pts

Course Grade Scale

A	≥900 pts
B+	≥880 pts
B	≥800 pts
C+	≥780 pts
C	≥700 pts
D	≥600 pts
F	<600 pts

The above course grading scale is assured, but may be *slightly* lowered based on class exam performance.

General Information

Honor Code: All students in CHM 112 are expected to adhere to the Mercer University Honor Code. Any suspected violations will be reported to the Honor Council for further investigation.

Attendance: Attendance will be taken for the first week of class. Even if a student is not in class, they are responsible for all material covered in class as well as any announcements made during the lecture period. Laboratory attendance is mandatory.

Aktiv Learning Online Homework: Online homework assignments will be provided via *Aktiv*, which you must purchase (or provided via the bookstore). Information on how to sign up will be given during the first week of class. Begin the assignments early so that you have an opportunity to address any technology issues. Late work will not be accepted except in extreme circumstances. Homework is an individual assignment; it is an honor code violation to work in groups or ask others how to do problems. As a group, you can study problems from the text on the same topics; when you are actually doing the online homework, however, it should reflect your individual understanding.

Missed Exams: Anyone missing an exam for *any* reason (personal illness, death in the immediate family, or other emergency) must notify Dr. Pounds **in advance** via e-mail, text message, phone, or voice message. The absence will be considered unexcused otherwise and no make-up opportunity will be offered. Make-up exams will be individually scheduled.

Test Grade Set Reduction: The lowest test grade of the semester will be omitted and the three highest test grades from the semester will be used in the final class average.

Quiz Grade Maximization: The eight quiz grades that maximize the students quiz point total will be used in the final class average.

Partial Credit: Partial credit will not be awarded on any quiz, exam, prelab, or lab report unless individuals show their work and clearly delineate how they arrived at their answers.

Re-grading Policy: If a student suspects that an error was made in the grading of a submitted work, they may return the paper for re-grading with the understanding that the entire work will be re-graded and not only the portion in question.

Posting of Grades: The *CANVAS* course delivery system does not have the ability to utilize grade forgiveness policies like the one used in this class. Therefore, to protect confidentiality, grades will not be posted. Students needing information about their grades should contact Dr. Pounds via e-mail.

E-mail Listserve: I maintain an e-mail listserve which I use copiously to send information to the class and which you can use to communicate with each other. Student Mercer e-mail addresses are automatically subscribed to the listserve. To add other e-mails to the listserve and to learn how to send information to it, please go to: <http://theochem.mercer.edu/mailman/listinfo/chm112>.

Starfish: This course will use Mercer's web-based success platform, *Starfish*. Throughout the term, you may receive *Starfish* emails containing feedback. These communications are sent to support your success at Mercer. You can access Starfish through your MyMercer portal. NOTE - if you want to contact me use my regular e-mail: pounds_aj@merc.edu.

Tips for Succeeding in Chemistry 112

There is unquestionably a lot of material to be covered in Chemistry 112. It is also more mathematically rigorous than CHM 111. For that reason it is imperative to keep up with the class. The last thing you want to worry about is covering two chapters of new material the night before the test. You are expected to keep up with the class reading and problems.

The book contains numerous problems which you should attempt. In addition I will give you a selection of problems you should attempt. The book problems and the additional problems are representative of some of the problems you will see on the exams. To become proficient you will need practice. In short, work as many problems as you can before the test. The student solutions manual provides solutions to the odd numbered problems. In addition, solutions to other problems described in class will sometimes be posted on the theoretical chemistry website (<http://theochem.mercer.edu/chm112>), or worked in class. Students who need solutions to additional even-numbered problems should contact the ARC or Dr. Pounds. Other than e-mail, the primary method of delivering information to the class will be via the theoretical chemistry website.

For more help in the course you should utilize the SI sessions for your class as well as the University's free tutoring service provided via the Academic Resource Center (ARC). Both of these resources are here for you to use and, although they can not guarantee a higher grade in the course, they will most likely increase your understanding of chemistry and thereby positively affect your performance in the class.

Tentative Class Schedule¹

Week Starting	Chapter Sections	Lecture and Problem Solving Topics
January 8 th	18.1 – 18.5	Introductions, Course Materials, and Structure Energy (Review) Entropy and Spontaneity Gibbs Free Energy
January 15 th	11.1 – 11.2 11.3 – 11.4	1/16 MLK HOLIDAY Intermolecular Forces Properties of Liquids, Vapor Pressure Crystal Structure and Lattices
January 22 nd	11.5 – 11.7 13.1 – 13.4	Properties of Solids Phase Changes, Phase Diagrams Physical Properties of Solutions Concentration and Solubility
January 29 th	13.5 – 13.7	Colligative Properties EXAM #1, 2/1/23 Colloids
February 5 th	14.1 – 14.2	Reaction Rates, Rate Laws and Reaction Orders Integrated Rate Laws
February 12 th	14.4 – 14.6	Temperature Dependence Reaction Mechanisms, Catalysis
February 19 th	15.1 – 15.2	Principles of Equilibria EXAM #2, 2/22/23 Equilibrium Constants
February 26 th	18.6 15.3 – 15.5	Thermodynamics and Equilibrium Equilibrium Expression and The Law of Mass Action Solving Difficult Equilibrium Problems Le Châtelier's Principle
March 5 th		SPRING BREAK
March 12 th	16.1 – 16.3, 16.12	Acid/Base Theories EXAM #3, 3/15/23 Self-Ionization of Water and pH
March 19 th	16.4 – 16.7	Weak Acids, Ionization Constants Acid-Base Conjugate Pairs Polyprotic Acids, Molecular Structure and Acid Strength LAST DAY FOR COURSE WITHDRAWAL 3/23/23
March 26 th	16.8 – 16.11 17.1 – 17.2	Hydrolysis The Common Ion Effect Acid/Base Titrations
April 2 th	17.3	Acid/Base Equilibria, Buffers, and Titration GOOD FRIDAY (4/7/23)
April 9 th	17.4 – 17.6	Common Ions and Solubility, Precipitation Reactions Solubility Equilibria Complex Ions
April 16 th	19.1 – 19.4	Redox Reactions and Galvanic Cells Cell Potentials EXAM #4, 4/19/23 BEAR DAY, 4/21/23
April 23 rd	19.5 – 19.8	Free Energy, Equilibrium, and Cell Potential The Nernst Equation Batteries and Corrosion (ACS EXAM, TBD)
April 30 th		FINAL EXAM, 5/5/23, 9 a.m. (FRIDAY)

¹ I reserve the right to modify this schedule as situations warrant.

The Laboratory

Safety always comes first in lab. Developing good lab safety habits is important, even if the day's lab activities are not particularly dangerous. You will not be allowed in lab if you are not prepared. That means being appropriately dressed, having your safety glasses and knowing what you are supposed to do during the lab. The lab schedule is found at the end of this document. A link to the lab instructions and report forms is found on the class web page.

The lab instruction PDF files SHOULD NOT be printed and brought to lab. No points will be awarded for printed laboratory procedures. Instead, read the manual and think about what you are going to do and why. Write down the procedure and any questions you have in your lab notebook before coming to lab. **If you do not have your notebook with the hand written procedure in it, you will not be allowed in lab.** The lab report forms available from the same web site should be printed and turned in along with the copy pages from your lab notebook. Data and observations MUST be written in your notebook, not on the lab report form. Due dates are listed on the class schedule. **No credit is available for the lab report if you miss lab for any unexcused reason, including showing up unprepared, or if you are more than 10 minutes late.** It is important to show up on time, since we will go over safety notes in the first few minutes. You will lose 1 pt for each safety violation in a lab period (ie. removal of safety glasses for any reason in the laboratory). Lab reports are due before, **NOT** during the next laboratory session.

If you must miss a laboratory meeting for a Mercer University event, or due to Mercer recommended COVID-19 isolation, you must let Dr. Pounds know in advance so that he can arrange for you to make up the lab or get the information and data to complete the lab notebook and report. Students will not be penalized for laboratories missed due to excused absence (as defined below) – up to a limit of three laboratory absences – and a complete laboratory report will still be required on the announced due date. **A passing grade for CHM 112 will NOT be available to any student who misses more than three laboratory meetings (excused or otherwise).**

Excused Absences (1) medical or mechanical emergencies with appropriate documentation presented to the professor as soon as possible (2) illnesses reported to the professor prior to the scheduled course meeting (documentation may be required); or (3) Mercer University events for which the appropriate office has provided an advance request to excuse participants.

Laboratory Grading:

There will be eight lab reports (25 pts each) over the course of the semester for a total of 200 pts. The laboratory component is thus worth 20% of your final grade for CHM 112.

Laboratory reports:

Complete laboratory reports should be turned in ONLINE on or before the time specified in CANVAS. The laboratory components will come in as two separate submissions.

1. Ordered and dated laboratory notebook pages (10 pts). These must include your partner's name.
2. Laboratory report (15 points). The will consist of the following items, in this order:
 - (a) Completed laboratory report form pages. These must include your partner's name.
 - (b) Any graphs required to determine the final result of an experiment – please see the graphing protocol, below.
 - (c) Sample calculations when needed to explain how you arrived at your results.
 - (d) It is acceptable to use computer software (including Microsoft Excel, MathCAD, Mathematica, etc.) to perform any calculations required to determine the final result. If you do use such software, simply include a printout as the last item in your report.

Graphing protocol:

All required lab report graphs must be computer-drawn, usually with Microsoft Excel, although other software options are permissible if pre-approved the instructor. CHM 112 students are allowed to sketch graphs (and anything else related to an experiment) in their lab notes, but the lab report that is turned in should include a computer-drawn graph if graphing was required. All data points should be shown on graphs, and the axes should be correctly labeled with both a measurement descriptive word (like “length”) and the corresponding units (like “cm”) inserted in the graphing software. Don’t include any hand-written work on your submitted graph unless specifically instructed to do so for a particular report.

Instructions for Writing in Your Lab Notebook:

Part of learning science includes practicing appropriate scientific methods. That process includes documenting your work. Here are a few instructions for using your laboratory notebook properly:

1. Every page should be dated; that’s the first thing you should write when you turn to a new page; put the date in the box provided in the upper corner of the page
2. Every entry in the lab notebook should have a clear, descriptive heading; examples include:
Instructions for Freezing Point Depression Lab
Data from Aqueous Equilibrium Lab
Calculations for Nickel Lab
3. Write under each heading in active voice in the first person, describing exactly what you plan to do, exactly what you did or exactly what you measured
4. Write in complete, grammatically correct sentences; lists, numbered protocols, and clearly labeled tables can also be appropriate in certain circumstances
5. Write in the notebook only with black ball-point pens [Chemistry students: get a supply of black ball-point pens, not just one]
6. Ideas and other notes about our lab work, including notes on preparing the lab report, should be entered in the lab notebook immediately after observations and other data recorded in the lab; this is part of what is called “thinking in the lab notebook”
7. Make drawings, especially of novel or unusual apparatus, big enough to draw lines/arrows in order to label the features illustrated
8. Construct tables with clearly labeled headings - including units - under which to record series of numerical data in the lab
9. Corrections to lab notes should be made on the originals with the copy page underneath. (Hint: You can put a torn-out copy page back under an original page and press firmly to record a correction on the copy page.) Don’t ever write (at all) directly on the copy pages.

Laboratory Policies:

Report Due Dates and Turn-in Policy: Labs are due prior to the time specified in CANVAS. Lab report items will be submitted as PDF document to a CANVAS dropbox. If you use your phone to make these documents please ensure that everything is readable. Late labs will be penalize 20% per day late.

Cell Phone: Out of courtesy for all those participating in the learning experience, all cell phones and pagers must be turned off before entering any classroom, lab, or formal academic or performance event.

Chemical Sensitivity Statement: This course includes the handling of chemicals, and the reasonable accommodation policy also applies to any chemical sensitivity, allergy, or other physical or medical condition that might limit a student’s ability to participate in the required course activities. In these cases, the instructor may require a physician’s documentation of the student’s condition before arranging accommodation. If the instructor determines that the student’s condition cannot be reasonably accommodated, then the student will be asked to select an alternative course.

Physical Limitations Statement: This course includes significant physical activity, and the reasonable accommodation policy also applies to any physical or medical condition that might limit a student’s ability to participate in the required course activities. In these cases, the instructor may require a physician’s documentation of the student’s condition before arranging accommodation. If the instructor determines that the student’s condition cannot be reasonably accommodated, then the student will be asked to select an alternative course.

Safety Statement: This course includes activities for which there are certain risks as well as established safety procedures to minimize these risks. The instructor will explain both the risks and the prescribed safety measures. Students enrolled in this course are required to document in writing their awareness of the reasonable risks inherent in the course activities and their agreement to follow the safety procedures specified by the instructor. If a student cannot meet these terms, then the student will be asked to select an alternative course.

Laboratory Schedule

Lab Day	Experiment
January 10 th	NO LAB
January 17 th	NO LAB
January 24 th	Check-in, Freezing Point Depression
January 31 st	NO LAB
February 7 th	Kinetics - Concentration Effects
February 14 th	Kinetics - Temperature Effects
February 21 st	Gaseous Equilibrium of NO ₂
February 28 th	NO LAB
March 7 th	NO LAB - SPRING BREAK
March 14 th	Equilibrium in Aqueous Solution
March 21 st	Acids, Bases, and Buffers
March 28 th	Thermodynamics of Borax Solubility
April 4 th	NO LAB
April 11 th	Electrochemistry and Check-Out
April 18 th	NO LAB - BEAR DAY
April 25 th	NO LAB - LAST WEEK OF CLASS

University Compliance Statements

Accommodations and ADA/504: “Students in need of accommodation due to a disability should contact the Access and Accommodation Office to complete the verification process to become approved for services. In order to receive accommodations, each term, students will request accommodation and faculty notification forms through the Access Office online system Accommodate. Students are strongly encouraged to schedule a meeting with each professor in a timely manner to discuss arrangements. Accommodations are not retroactive in nature. Note - Disability accommodations or status are not reflected on academic transcripts. Students with a history of a disability, perceived as having a disability or with a current disability who do not wish to use academic accommodations are also strongly encouraged to complete the verification process with the Access Office. Students must request accommodations in a timely manner to receive accommodations in a timely manner.

The Access Coordinator for Macon Campus is

Katie Johnson, Director and ADA/504 Coordinator.
 Phone: (478) 301-2778; email: johnson_kc@mercer.edu
 Website:
<https://access.mercer.edu>

Please note the following additional information from the Access and Accommodation Office (AAO):

In compliance with Section 504 of the Rehabilitation Act of 1973 (504) and the Americans with Disabilities Act Amendments Act of 2009 (ADAAA), “otherwise qualified” students with disabilities are protected from discrimination and may be entitled to “reasonable accommodations” intended to ensure equal access to all courses, programs, and services without a change of curriculum. Examples of accommodations include but are not limited to: testing accommodations, providing alternative format textbooks and tests, note-taking support, and modifications of policies or procedures. Equal Access may require moving a class or event to a physically accessible room, making websites accessible to screen readers, providing sign language interpreters, and captioning videos. All students requesting to be recognized as a student with a disability or requiring accommodations must first self-identify by requesting accommodations with the designated Access Coordinator for their campus or program and complete the verification process.”

Mental Health and Wellness: “Mercer University faculty and staff recognize that mental health concerns can impact academic performance and interfere with daily life activities. Because stress is a normal part of the college experience, learning to manage stress effectively is crucial to your well-being and overall success. Please notify your faculty member or academic advisor for academic assistance, as needed. CAPS can also provide support if you are feeling anxious, overwhelmed, depressed, lost or are struggling with personal issues. Please call or visit the Counseling and Psychological Services (CAPS) website at <https://counseling.mercer.edu/> for more information. These services are free and confidential, and support non-traditional, graduate, and undergraduate students. Students may access CAPS at the location of their academic program: MACON – Counseling Center (formerly the Honors House), 478-301-2862; ATLANTA – 215 Sheffield Student Center, 678-547-6060. Students at Regional Academic Center and other locations may obtain assistance in finding local services by contacting

the CAPS Office nearest them. We also encourage students to call or text 988 to reach the National Suicide & Crisis Line if needed.”

Electronic Submission of Materials: “Students bear sole responsibility for ensuring that papers or assignments submitted electronically to a professor are received in a timely manner and in the electronic format(s) specified by the professor. Students are therefore obliged to have their e-mail client issue a receipt verifying that the document has been received. Students are also strongly advised to retain a copy of the dated submission on a separate disk. Faculty members are encouraged, but not required, to acknowledge receipt of the assignment.”

Cell Phones and Pagers: “Out of courtesy for all those participating in the learning experience, all cell phones and pagers must be turned off, or placed on vibrate, before entering any classroom, lab, or formal academic or performance event.”

FERPA and Assessment: The College of Liberal Arts is keenly interested in assuring the quality and integrity of its general education program. Every semester, randomly selected samples of student work from general education courses will be independently and objectively assessed. No personally identifiable information about any student will be used for the purposes of this assessment, and assessment results will have no bearing whatsoever on student grades.

Course Evaluations: In an ongoing effort to improve the quality of instruction, each student enrolled in this course is required to complete an end-of-semester course evaluation. Details about the evaluation process will be provided at the end of the term.



University Health and Safety Protocols for the Spring 2023 Semester Syllabus Statement for All Students

Office of the Provost 478-301-2110

Campus Health's COVID-19 Hotline 478-301-7425

In order to promote safe campuses, students are required to follow these COVID-19 protocols:

- Check the University [COVID-19 website](#) and your Mercer email for important updates and messages.
- Masks are not required on campus, except at the Campus Health Centers on the Macon and Atlanta campuses. Of course, anyone who chooses to wear a mask on campus for their own protection is welcome to do so. Faculty may require masks when meeting in their individual offices with students, colleagues, or guests. Health science students and employees may be required to wear masks in clinical settings.
- If you are [symptomatic of COVID-19](#), regardless of vaccination status, you cannot attend in-person classes, labs, orientations, clinical/field experiences, other on-campus activities, or employment on campus. You should immediately call Campus Health's COVID-19 Hotline at (478) 301-7425 for a testing appointment during regular business hours or get tested immediately at an off-campus location. If symptomatic and tested off campus, please call to inform Mercer Medicine at (478)-301-7425.
- If you are [asymptomatic](#) (showing no symptoms) and would like to get tested, go to go.mercer.edu/covidappt to schedule an appointment at the Macon or Atlanta Campus Health Center.

There have been changes to insurance coverage for COVID-19 testing. As a result, Mercer Medicine will bill your insurance company for COVID-19 testing if you are symptomatic or have been exposed recently to someone who has tested positive for COVID-19. The University covers the costs of COVID-19 testing for Mercer on Mission, Study Abroad, and other University-related international travel programs. If you are tested for other reasons, you will be required to pay \$90 at the time of testing.

- Testing locations:
 - Macon – Campus Health Center, Drake Field House, Macon Campus
 - Atlanta – Campus Health Center, Sheffield Building, Atlanta Campus
 - Savannah – Memorial University Medical Center, Savannah Campus (Dr. Kirkpatrick)
 - Columbus – Mercer University School of Medicine, Columbus Campus (Dr. House)
- Mercer Medicine accepts off-campus PCR test results and **positive** antigen test (known as rapid test) results from reputable testing facilities.

Mercer Medicine does NOT accept

- [negative](#) antigen test (called rapid test) results;
 - home/self test results; and
 - antibody test results.
- All students must submit **off-campus, positive COVID-19 results** immediately to Campus Health at mytestreport@mercer.edu. In the subject line of the email, type "Macon Test" (for Macon, Savannah, and

Columbus students) or type “Atlanta Test” (for Atlanta, Henry, and Douglas students). Be sure to include your full legal name and Mercer ID in the body of the email.

Off-campus positive results must be submitted to Campus Health as soon as you receive them. If you fail to submit your results in a timely manner, excused absences and academic accommodations will not be provided beyond the five days after testing.

- If you test at the Campus Health Center and test **positive**, a Campus Health staff member will call you from a Mercer phone number with the positive result. With a **negative** result, you will receive an email in your Mercer email account.
- Do not submit COVID-19 results directly to faculty, the Dean’s Office, or Student Affairs for COVID-related, excused absences. All COVID-related absences must be processed through Campus Health and the Office of the Provost. Faculty are then notified of a student’s COVID-related, excused absence(s).
- Faculty are required to provide academic accommodations to students who are in isolation after either testing positive at the Campus Health Center or submitting off-campus, positive test results to Campus Health at mytestreport@mercer.edu.
- If you **are symptomatic and awaiting test results**, you must isolate and be provided academic accommodations during this brief isolation period. If you tested on campus, faculty will be notified. If you are symptomatic, tested off campus, and are awaiting results, contact Campus Health immediately at 478-301-7425 so that faculty can be notified. If you do not receive your results within two (2) business days, contact Campus Health at 478-301-7425 for a testing appointment on campus.
- The isolation period for COVID-19 has been reduced to **five days**. While in isolation, you must complete your daily Bear Check as a way for Mercer Medicine to monitor your symptoms. The Bear Check is located in MyMercer > Dashboard > Action Items.

You must remain in isolation until you are cleared by Mercer Medicine.

- **Residential students** who test positive have these isolation options:
 - Recover at home, if possible.
 - Isolate in place in your own room. Isolating in place means that you stay in your current residence, distance yourself from roommates/suitemates as much as possible, and wear a mask inside the residence as often as possible. Roommates/suitemates should also wear masks inside the residence as often as possible.

You may leave your assigned room, while wearing a mask, **only** to seek medical care and pick up to-go or delivery meal options to eat in your room. For students on the Macon campus, Aramark provides to-go meals.

Contact the Office of Housing and Residential Life with questions or concerns:

Macon: (478) 301-2687

Atlanta: (678) 547-6104