

CHEM 1412 General and Quantitative Chemistry II**Faculty contact:**

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Office Hours: TR 10:50-11:30 am & W 2:00-4:00 pm

Introduction: *General and Quantitative Chemistry II*. 4 Semester Hours: 2.5 hours of lectures and 4 hours of laboratory per week. This course is part of the University Studies core courses and will meet criteria for laboratory science credits.

This is the second part of a two-course sequence of general chemistry. The course is designed primarily for the students majoring in sciences or in pre-professional programs. By the end of the course you will be familiar with a range of fundamental chemistry topics including chemical reaction rates, chemical equilibrium, acid-base chemistry, solubility, thermodynamics, electrochemistry, nuclear chemistry, organic chemistry, inorganic chemistry and biochemistry. Chemists deal with these subject areas every day, but these concepts are also crucially important to other branches of science and technology.

Course Materials:

Textbook: *General Chemistry*, 10th Edition, Ebbing, Gammon, Houghton Mifflin Company, New York, NY, copyright 2009.

Experiments in General Chemistry, 10th Edition, by R.A.D. Wentworth, published by Houghton Mifflin Company, New York, NY.

A pair of safety goggles and a padlock

Classroom: Lecture Chem 1412 TR 9:30–10:45 am in Science 123

Prerequisite: The student must have completed Math 141 or be concurrently enrolled in math 142 or other higher level courses in mathematics. Students who had adequate high school preparation in mathematics or were exempted from Math 141 will be allowed to enroll with the instructor's consent. Concurrent enrollment of Math 141 with CHEM 1412 generally is not encouraged. Students who are currently enrolled in math remediation courses such as PJCM 300, PJCM 306, or Math 131 will not be eligible for enrollment in CHEM 1412.

Attendance Policy: All students are expected to attend classes on a regular basis. The Department of Chemistry adheres to the attendance policy set by the University as stated in the most current Undergraduate Catalog. The attendance record is taken from the **daily sign-in sheet**. A student who is late by more than 5 minutes or fails to sign the sign-in sheet will be counted as missing a lecture. **Excessive absence is defined as missing more than 10% of the lectures or more than 10% of the laboratory sessions without excusable reasons.** Excessive absence will be reported to the Dean of the College and the Dean of Students. In addition, **according to the TAMU-Commerce Procedure A13.02, if a student has excessive absences, the instructor may drop the student from the course.** The instructor will only excuse an absence if the student provides, with appropriate document, an excusable reason allowed by the TAMU-Commerce Procedure A13.02. Good class attendance will be necessary in order to pass this course.

Student Conduct Policy: All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment (see Student's Guidebook, Policies and Procedures, Conduct). Any student engaging in disruptive

behavior will be dismissed from class on the first offence. A second offence may constitute dismissal from the course with a failing grade.

Cheating and other Breaches of Academic Conduct: Academic cheating, plagiarism, and other forms of academic misconduct may result in removal of the student from class with a failing grade or may in extreme cases result in suspension or expulsion from the University as described in the Code of Student Conduct section of the Student's Guidebook.

Students with Disabilities: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact: **Office of Student Disability Resources and Services, Texas A&M University-Commerce, Gee Library, Room 132, Phone (903) 886-5150 or (903) 886-5835, Fax (903) 468-8148** StudentDisabilityServices@tamuc.edu

Pointers to Succeed in CHEM 1412:

1. The lectures in this course will cover topics from Chapters 12 through 23 of the assigned textbook. This material will be covered at the rate indicated by the *Tentative Class Schedule*. *Be sure to read the textbook before coming to the lectures*. The lectures will focus on important chemistry concepts but will not serve as a substitute for reading the textbook. The textbook is a more detailed presentation with a more extensive set of example problems. Chemistry is a physical science and it is imperative to master calculations to pass the course.

2. *Finish your homework promptly*. Even though the homework is not turned in or graded, working the problems will help you succeed in the course. The more problems that you work the better prepared you will be for exams.

3. *Read the experiment carefully before coming to lab*. A Pre-Lab assignment will be due at the beginning of each laboratory session. The Pre-Lab will be graded and account for 20% of the total lab grade. Therefore, it is necessary to read and understand the concepts as well as the procedure involved in the experiment carefully beforehand. The lab report is due at the beginning of the next laboratory session.

4. *Be professional*. The lab grade is also dependent on your behaviors in the lab, such as adherence to the safety rules, keeping your bench neat during the laboratory and cleaning up your laboratory area throughout the lab period.

Grading/Evaluation

The grade for this course will be derived as follows:

CHEM 1412: Lecture and Laboratory (graded as a single 4-credit hour course.)

Lecture Portion: 75% of course grade

Four examinations 80 % of lecture grade (60% of course grade)

Final Exam 20 % of lecture grade (15% of course grade)

Late work will not be accepted, and makeup quizzes or exams will not be given. If you miss an exam, for whatever reason, the points for the missed exam will be placed on your final exam, making your final exam count for a greater percentage of your grade. The final exam will be comprehensive and cover material from Chapters 12-23. Grading will be based on a scale: 100-86 = A; 85-73 = B; 72-60 = C; 59-45 = D; 45-below = F. Dishonest scholarship will earn an automatic zero (0) and initiate prosecution to the fullest extent. Incomplete grades may be given

only if the student has a current average $\geq 70\%$ and is precluded from completion of the course by a documented illness or family crisis.

Laboratory Portion: 25% of course grade. The lab report with the lowest score will be dropped. The average of the grade for the rest of the eleven laboratories will constitute the laboratory grade.

Individual prelab reports	20%
Individual lab reports	70%
Inquiry based team lab project	10%
Total	100%

Lecture Learning Outcomes / Course Objectives:

Upon completion of the course, I intend for my students to have realized a number of objectives.

1. Be able to critically analyze a chemical problem and deduce a solution to the problem utilizing step-wise processes. Thus, students will be able to analyze, evaluate, or solve problems when given a set of circumstances or data. Such as use LeChatelier's Principle to predict the effects of concentration, pressure and temperature changes on equilibrium mixtures.
2. Students will be able to demonstrate proficiency in solving mathematical problems related to kinetics and equilibrium.
3. Students will be able to understand and utilize mathematical functions and empirical principles and processes to solve quantitative problems. Such as use the Henderson-Hasselbalch equation to find the PH for the buffer solution.
4. Understand the concept of chemical equilibrium, and the energies that drive chemical reactions: an introduction to the field of thermodynamics.
5. Understand the concept of chemical kinetics and the energy required to initiate a chemical reaction.
6. Demonstrate proficiency in naming organic compounds, solving nuclear equations, and determining properties of inorganic compounds.

Laboratory Learning Outcomes / Course Objectives:

By the end of the semester I intend for my students to have realized a number of objectives.

1. Demonstrate proficiency in assembling basic laboratory glassware, performing fundamental laboratory techniques, making and recording relevant experimental observations, and interpreting the results. Record, graph, chart and interpret data obtained from experimentation and use that information to understand and explain chemical phenomena.
2. Learn the safety requirements and methods needed to work in a chemistry laboratory. Learn how to safely handle, utilize and dispose of chemicals.
3. Learn how to document laboratory experiments, how to maintain a scientific notebook.
4. Communication in the form of laboratory reports will be clear, purposeful, and make appropriate use of evidence, data and technology as applicable.
4. In laboratory experiments, you should be able to both individually and within a team with fellow classmates, conduct laboratory experiments, critically analyze data, draw conclusions from the data, and clearly and concisely report the observations and conclusions drawn from the laboratory experiments.

Tentative Lecture Calendar

Week Starting	Chapter	Topics
8/26-8/28	Chapter 12	Solutions
9/2-9/4	Chapters 12/13	Solutions/Chemical Equilibrium
9/9-9/11	Chapters 13/14	Rates of Reaction/Chemical Equilibrium
9/16-9/18	Chapter 14	Chemical Equilibrium
9/23-9/25	Chapter 14/15	Exam 1 (Chapter12-14)/Acids and Bases
9/30-10/2	Chapters 15/16	Acids and Bases /Acid-Base Equilibria
10/7-10/9	Chapter 16/17	Acid-Base Equilibria/Solubility and Complex-Ion Equilibria
10/14-10/16	Chapter 17	Solubility/ Exam 2 (Chapter15-17)
10/21-10/23	Chapter 18	Thermodynamics and Equilibrium
10/28-10/30	Chapter 18/19	Equilibrium/Electrochemistry
11/4-11/6	Chapter 19	Electrochemistry
11/11-11/13	Chapter 19	Electrochemistry / Exam 3 (Chapter18-19)
11/18-11/20	Chapters 23	Organic Chemistry
11/25	Chapters 23/20	Organic Chemistry/Nuclear Chemistry
12/2-12/4	Chapters 20/21-22	Nuclear Chemistry/Main Group and Transition Elements(handout) / Exam 4 (Chapter20-23)
12/9-12/11	Final Examination	Covers chapters 12-23
Recommended HW problems and examples		
Chap. 12: 47, 49, 53, 55, 57, 69		
Chap. 13: 43,45,46,51,55,63,77		
Chap. 14: 35, 43,51,65,73		
Chap. 15: 36,51,53,59,67,79		
Chap. 16: 33,35,38,50,52,75		
Chap. 17: 27,29,37,41,47,59,61		
Chap. 18: 31,35,39,41,45,59,63		
Chap. 19: 35,37,49,54,57,63,66,78,82,86		
Chap. 20: 19,33,35,37,39,41,43		
Chap. 23: 27, 37, 38,39		

Tentative Laboratory Calendar

You must bring a lock to your first laboratory meeting.

Safety goggles, long pants and closed toed shoes are required to be worn during all laboratory experiments.

Week	Date	Experiment
1	8/26-8/28	Check in equipment, Safety lecture & quiz
2	9/2-9/4	Experiment 12B: Softening Hard Water
3	9/9-9/11	Experiment 12A: A Molar Mass from Freezing Point
4	9/16-9/18	Experiment 13: The Rate of an Iodine Clock Reaction
5	9/23-9/25	Experiment 14A: Le Chatlier's Principle
6	9/30-10/2	Experiment 14B: Determination of an Equilibrium Constant
7	10/7-10/9	Experiment 15: The Relative Strengths of Some Acids
8	10/14-10/16	Experiment 16A: Equilibria with Weak Acids and Weak Bases
9	10/21-10/23	Experiment 16B: An Acid-Base Titration Curve
10	10/28-10/30	Experiment 17A: A Solubility Product Constant
11	11/4-11/6	Experiment 17B: Qualitative Analysis of Ag^+ , Cu^{2+} , Zn^{2+} , and Ca^{2+} ions
12	11/11-11/13	Team-based guided-inquiry experiment (part1)
13	11/18-11/20	Team-based guided-inquiry experiment (part2)
14	11/25-11/27	No Labs-Thanksgiving
15	12/2-12/4	Check-out