CHEM 1411 General and Quantitative Chemistry

Faculty contact:
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Office Hours: M-R: 11:00-12:00 pm or by appointment

Introduction: ***General and Quantitative Chemistry I***. 4 Semester Hours: 3 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 first part of a two-course sequence of general chemistry. This course is designed primarily for the students majoring in sciences or in pre-professional programs. Topics covered include the scientific method, characteristics and transformations of matter, atomic theory, chemical reactions, the behavior of gases, an introduction to energy, and bonding and shapes of molecules. Chemists deal with these topics every day, but these concepts are also crucially important to other branches of science.

Course Materials*:*
Lecture textbook: **Chemistry, an atoms-focused approach**, by Thomas Gilbert, Rein Kirss, and Natalie Foster, (W.W. Norton and Co publisher) Hardcover ISBN: 978-0-393-91234-0 or Paperback: ISBN: 978-0-393-12419-4, or 3-hole punch version of the textbook: ISBN: 978-0-393-12420-0 or e-book version (Nortonebooks.com).

Smartwork (an online homework system). Should be available for free with new textbook purchase or can be purchased directly as a stand-alone product. smartwork.wwnorton.com

Laboratory textbook: ***Experiments in General Chemistry***, 10th Edition, by R.A.D. Wentworth, published by Houghton Mifflin Company, New York, NY. ISBN: 9781111989422

A pair of safety goggles and a padlock

Classroom: Lecture section 1: MWF 12:00 – 12:50 pm in STC127
section 2: TR 12:30-1:45 pm in STC 127

Laboratory meets in STC310 or STC311

Prerequisite: The student must have completed Math 1314 or be concurrently enrolled in math 142. Students who had adequate high school preparation in mathematics or were exempted from Math 1314 will be allowed to enroll with the instructor's consent. Concurrent enrollment of Math 1314 with CHEM 1411 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 1411.

Grading/Evaluation
The grade for this course will be derived as follows:
CHEM 1411: Lecture and Laboratory (graded as a single 4-credit hour course.)
Lecture Portion: 75% of course grade
Laboratory: 25%

Lecture:

Three of Four examinations:	22.5% each, 67.5% of lecture grade
Homework	10%
Final Exam:	22.5% of lecture grade

Late work will not be accepted, and makeup exams will not be given. If you miss an exam, for whatever reason, you can drop one exam. If you miss two exams, you will receive a grade of zero for that exam and any subsequent exam that you miss. The final exam will be comprehensive over all material covered in the class. The last drop date for the course is ***June 29, 2015***. Grading will be based on a standard percentage scale: 100-90 = A; 89-80 = B; 79-70 = C; 69-60 = D; 59-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 ≥70% and is precluded from completion of the course by a documented illness or family crisis. **You will be allowed to drop one exam if you do not miss more than 3 class periods**. **If you miss 4 or more class periods you will not be allowed to drop an exam. In this case, your grade will be based on the four exams, group work and the final exam.**

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

Prelab reports:	25%
Postlab reports:	75%

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 a 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 13.99.99.R0.01, 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 documentation, an excusable reason allowed by the TAMU-Commerce Procedure 13.99.99.R0.01. 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, TAMU-Commerce Procedure 13.02.99.R0.06). 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 A&M-Commerce Procedure 13.99.99.R0.10.

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

Lecture Learning Outcomes / Course Objectives

Upon completion of the course, I intend for my students to have realized a number of objectives.
1. Students will be able to analyze, evaluate, or solve problems when given a set of circumstances or data. Be able to critically analyze a chemical problem and deduce a solution to the problem utilizing step-wise processes.
2. Students will be able to understand and utilize mathematical functions and empirical principles and processes to solve quantitative problems. General chemistry requires good algebra skills. By the end of this course, you should be able to utilize algebraic skills to solve chemical problems.
3. Student communication will be clear, purposeful and make appropriate use of evidence, data and technology as applicable.
4. Students will be able to work together toward a shared purpose relevant to the course or discipline with a sense of shared responsibility for meeting that purpose.

General Content Knowledge Students Should Obtain

1. Know the nature of the bonding in compounds.
2. Relate the structure found in a given molecule to its physical and properties.
3. All students must know basics of IUPAC nomenclature of compounds.
4. Know the importance of chemistry and its relationship to other disciplines and our daily lives.
5. Understand the basic structures of atoms, ions, and molecules, and ways to quantitatively describe the properties of atoms and molecules in the various phases of pure matter and in mixtures.
6. Understand the reactivity of atoms, ions, and molecules, and the various qualitative and quantitative methods for describing or depicting chemical reactions.
7. Understand the concept of chemical equilibrium, and the energies that drive chemical reactions: an introduction to the field of thermodynamics.
8. Understand the relationship between the electronic configurations of atoms and molecules and their chemical properties: an introduction to the field of quantum mechanics.

Laboratory Course Objectives:

By the end of the semester I intend for my students to have realized a number of objectives.
1. All students must be able to readily identify glassware commonly used in the chemistry laboratory and know how to properly utilize the glassware.
2. Learn basic chemistry techniques, such as how to calculate percent yields, how to properly use measuring devices, how to properly clean glassware at the end of an experiment.
3. Learn the safety requirements and methods needed to work in a chemistry laboratory. Learn how to safely handle, utilize and dispose of chemicals.
4. Learn how to document laboratory experiments, how to maintain a scientific notebook.
5. 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.

Pointers to Succeed in CHEM 1411:

1. The lectures in this course will cover Chapters 1 through 11 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*. 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 account for 25% of the experiment report grade. It is necessary to read and understand the concepts and the procedure involved in the experiment beforehand. The final report is due at the beginning of the next laboratory session.

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	June 8	Check in equipment, Safety lecture & quiz
	June 9	1C. Some Measurements of Mass and Volume
	June 10	2. Isotopes and Mass Spectrometry
	June 11	7. The Absorption Spectrum of Cobalt(II) Chloride
2	June 15	**No lab scheduled: Dr. Starnes may use this time to complete lecture over chapters 1-4 if the class is behind**
	June 16	1A. Identification of an Unknown Compound
	June 17	10A. Geometric Isomers
	June 18	8. Solubility Within a Family
3	June 22	3A. The Empirical Formula of an Oxide
	June 23	**No lab scheduled: Dr. Starnes may use this time to complete lecture over chapters 4-7 if the class is behind**
	June 24	5B. The Decomposition of Potassium Chlorate
	June 25	4B. Ionic Reactions in Aqueous Solution
4	June 29	3B. Hydrates and Their Thermal Decompositions
	June 30	9A. The Identity of an Insoluble Precipitate
	July 1	**No lab scheduled: Dr. Starnes may use this time to complete lecture over chapters 7-9 if the class is behind**
	July 2	6. Thermochemistry and Hess's Law
5	July 6	To be announced
	July 7	Laboratory Check-Out, Return Equipment to Stockroom. **Dr. Starnes may use remaining time to complete lecture over chapters 10-11 if the class is behind**
	July 8	To be announced
	July 9	No laboratory experiment scheduled

Tentative Lecture Calendar

Week	Date	Chapter	Topics
1	June 8	Chapter 1: Matter and Energy: An Atomic Perspective	Mass conservation, matter, Physical Measurements
	June 9	Chapter 2: Atoms, Ions, and Molecules: The Building Blocks of Matter	Atomic theory and structure, mass and moles of a substance, Avogadro's number
	June 10	Chapter 3: Atomic Structure: Explaining the Properties of Elements	Light wave and photons, Electronic structure of atoms, Bohr theory, Quantum mechanics, Atomic orbitals, Periodicity of the elements
	June 11	Finish chapters 1-3	
2	June 15	Chapter 4: Chemical Bonding: Understanding Climate Change	Chemical substances, Lewis structures, ionic and covalent bonds, polarity, resonance, formal charge, electronegativity
	June 16	**Exam 1**	**Chapters 1-3**
	June 17	Chapter 5: Bonding Theories: Explaining Molecular Geometry	VSEPR model and geometry, valence bond theory, molecular orbital theory, polarity
	June 18	Chapter 6: Intermolecular Forces: Attractions Between Particles	London dispersion forces, dipole-dipole attractions, hydrogen bonding, viscosity, solubility trends, phase diagrams
3	June 22	Chapter 7: Stoichiometry: Mass Relationships and Chemical Reactions	Chemical reaction types, Stoichiometry, Percent & theoretical yield
	June 23	Finish chapters 4-7	
	June 24	**Exam 2**	**Chapters 4 – 6**
	June 25	Chapter 8: Aqueous Solutions: Chemistry of the Hydrosphere	Ions in aqueous solution, electrolytes, acids and bases, solutions, dilutions, quantitative analysis**,** oxidation-reduction reactions
4	June 29	Finish chapter 8	**Last day to drop**
	June 30	Chapter 9: Thermochemistry: Energy Changes in Chemical Reactions	Reaction heat, enthalpy heat changes in processes, heat capacity, calorimetry, Hess's Law, standard heats of reaction
	July 1	Chapter 10: Properties of Gases: The Air We Breathe	Gas laws, Kinetic-molecular theory
	July 2	**Exam 3**	**Chapters 7 – 9**
5	July 6	Finish chapter 10	
	July 7	Chapter 11: Properties of Solutions: Their Concentrations and Colligative Properties	Vapor pressure, molality, colligative properties, osmosis
	July 8	**Exam 4**	**Chapters 10-11**
	July 9	**Final Examination**	**Chapters 1-11**