ADVANCED GENERAL CHEMISTRY / F14

Section 001

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CHM 115 is an accelerated general chemistry course which seeks to unify many of the themes in General Chemistry to develop a comprehensive conceptual understanding of the subject. Students in CHM 115 will be introduced to the microscopic and macroscopic descriptions of matter and its behavior. They will be exposed to the fundamental laws of mass and energy conservation and their application to chemical systems and reactions. Students will also be introduced to the fundamentals of chemical thermodynamics and its bearing on equilibrium in gases, acids and bases, and ionic solutions. Students in CHM 115 are expected to read at the college level and also set up and solve algebraic equations, trigonometric equations, and equations involving differentials. For that reason, MAT 191 (Calculus) is a corequisite for the course. 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 9:00–9:50 a.m., WSC Room 310
	R 9:25–10:15 a.m., WSC Room 310
Lab:	R 3:05 – 5:45 p.m., WSC Room 308

Course Materials

Principles of Modern Chemistry, Oxtoby, Gillis, and Campion 7$^{\text{th}}$ ed.,
Laboratory Notebook (numbered, carbonless pages, available at bookstore)
Scientific Calculator
Approved Safety Glasses/Goggles
Lock (one per set of lab partners)

Course Structure

The three lecture hours each week will be used to expound on and augment the text. An additional hour each week will be used to explore advanced problem solving techniques as well as computational problem solving methods. 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 will not be collected, students are encouraged to complete as many problems as possible to gain competency with the material. Several unannounced in-class quizzes will be given during the semester. The best five grades from the quizzes will count toward the final grade. Four hour-long exams will be given per the schedule. A three hour final exam will be administered at the end of the term.

Grading

Tests (best 4 @ 100 pts)	400 pts
Quizzes (best 5 @ 20 pts)	100 pts
Laboratory (15 @ 20 pts	300 pts
Final Exam	200 pts
Total Possible	1000 pts

The following grading scale is assured but *may* be *slightly* lowered based on test results.

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

General Information

Honor Code: All students in CHM 115 are expected to adhere to the Mercer University Honor Code. Any suspected violations will be reported to the Honor Council for further investigation.

Attendance: Except for the first day of the semester, attendance will not be taken. However, students are still accountable for all material covered in class as well as any announcements made during the lecture period.

Missed Quizzes: No makeup quizzes will be given.

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. The absence will be considered unexcused otherwise. Make-up exams will be individually scheduled.

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: Grades in CHM 115 will not be publically posted. If you have questions regarding your grade, see Dr. Pounds.

E-mail Listserve: I maintain an e-mail listserve which I use use copiously to send information to the class and which you can use to communicate with each other. To sign up for the listserve and to learn how to send information to it, please go to: `http://theochem.mercer.edu/mailman/listinfo/chm115`.

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 alternate course.

American Disability Act: "Students requiring accommodations for a disability should inform the instructor at the close of the first class meeting or as soon as possible. The instructor will refer you to the ACCESS and Accommodation Office to document your disability, determine eligibility for accommodations under the ADAAA/Section 504 and to request a Faculty Accommodation Form. Disability accommodations or status will not be indicated on academic transcripts. In order to receive accommodations in a class, students with sensory, learning, psychological, physical or medical disabilities must provide their instructor with a Faculty Accommodation Form to sign. Students must return the signed form to the ACCESS Coordinator. A new form must be requested each semester. 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 register with the ACCESS and Accommodation Office and request a Faculty Accommodation Form each semester. For further information, please contact Carole Burrowbridge, Director and ADA/504 Coordinator, at 301-2778 or visit the ACCESS and Accommodation Office website at http://www.mercer.edu/disabilityservices"

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."

Tips for Succeeding in Chemistry 115

There is unquestionably a lot of material to be covered in Chemistry 115. 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 unannounced quizzes are an added incentive for you to do this.

You should work as many problems as you can from the text. These problems are representative of some of the problems you will see on the exams. To become proficient you will need practice. The student solutions manual provides solutions to the odd numbered problems. In addition, solutions to the recommended even numbered problems will be posted on the WWW (`http://theochem.mercer.edu/chm115`), or worked in class. Students who need solutions to additional even-numbered problems should contact Dr. Pounds.

For more help in the course you should utilize the SI sessions for your class as well as the University's free tutoring service. 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 Schedule[1]

Week Starting	Chapter Sections	Lecture and Problem Solving Topics
August 17th	Appendices A-C	Mathematical Preliminaries
	1.1–1.4	Foundations of Modern Chemistry
August 24th	2.1–2.6	Stoichiometry
	3.1–3.2	Molecular Representation
		The Periodic Table
August 31st	3.1–3.18	**LABOR DAY #1 (9/1)**
		Classical Bonding Theory, Lewis Diagrams, VSEPR
September 7th	4.1–4.6	Quantum Mechanics - Foundations
		EXAM #1 (9/10)
		Bohr Model
		Schrödinger Equation
September 14th	5.1–5.5	Quantum Mechanics - Atomic and Molecular Structure
	6.1–6.13	LCAO Theory and Valence Bond Theories
	7.3–7.4, 8.4	Applications
September 21st		**EXAM #2 (9/24)**
	9.1–9.7	Gas Laws
		Kinetic Theory of Gases, Real Gases
	10.1–10.6	Bulk Properties and Intermolecular Forces
September 28th	11.1–11.7	Solutions
		FALL BREAK
October 5th	12.1–12.7	Thermodynamics
		EXAM #3 (10/8)
		Heat Capacity
		Enthalpy
October 12th	13.1–13.7	Entropy, Spontaneity
		Thermodynamic Equilibrium and the Gibbs Free Energy
	14.1–14.2	Chemical Equilibrium
		Law of Mass Action
October 19th	14.3–14.8	Equilibrium Calculations
		Heterogenous Equilibrium
		EXAM #4 (10/22)
October 26th	15.1–15.4	Acid-Base Theory
		The pH Scale
		Acid/Base Equilibrium
November 2nd	15.5–15.8	Buffers and Titrations
		Polyprotic Acids
	16.1–16.3	Solubility
November 9th	16.4–16.5	pH and Solubility
		Complex Ions and Solubility
	17.1–17.5	Redox Reactions
		Electrochemical Cells, Faraday's Laws, and Cell Potential
		Concentration Effects
November 16th	17.6–17.7	Batteris, Fuel Cells, and Corrosion
		EXAM #5 (11/19)
	18.1–18.2	Chemical Kinetics
		Rate Laws
November 23rd	18.3–18.4	Reaction Mechanism
		THANKSGIVING BREAK
November 30th	18.5–18.8	Temperature Dependence
		Kinetic Theories and Activation Energy, Catalysis
December 7th		**FINAL EXAM, 12/13/14, 9 a.m.**
		(Saturday)

[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 days lab activities arent 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 and instructions are available at: `http://theochem.mercer.edu/chm115` in the LAB section.

The lab manual pdfs SHOULD NOT be printed. 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 steps from the procedure that you need to complete the lab and any questions you have in your lab notebook before coming to lab. **If you do not have your notebook with the hand written procedural notes in it, you will not be allowed into the lab.** The lab report forms are available from the same web site should be printed and turned in along with the yellow copies from your notebook. Data and observations MUST to 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, you need to see Dr. Pounds at least one week in advance to construct a remediation plan. 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 115 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.

It is imperative that you attend lab on the date scheduled. Because there is only only section of CHM 115 it will be impossible to make up any labs. Absences due to medical illness or mechanical failures are considered excused. If you are going to miss lab for any reason except a mechanical failure, you must notify Dr. Pounds prior to the absence or the absence will be considered unexcused. You may do this via phone, email, or text message. Unexcused lab absences will result in a zero grade for the lab and more than two or more unexcused absence will result in a failing grade for the course. In the event that a student is granted an excused absence, the average of their other lab grades will be used to compute the missing grade or they will be allowed to write up the lab using previously collected data if it is available. Students who have a excused absence for a University sanctioned event still must notify Dr. Pounds if they are going to miss lab. Again, missing more than three labs, excused of unexcused, will result in a failing grade in the course.

Laboratory Grading:

There will be 15 pre-lab exercises (5 pts each) and 15 lab reports (15 pts each) over the course of the semester for a total of 300 pts. The laboratory component is thus worth one 30% of your final grade for CHM 112. Labs are due prior to the beginning of the following lab session (see table below), and Labs 14 and 15 will be due to Dr. Pounds at the beginning of lecture on 1 December 2014. Late labs will lose 5 points/day, with a grade of zero resulting if the write-up is more than 3 days late.

Prelabs:

Pre-lab exercises will be administered via *BlackBoard*. More information related to these exercises will be provided prior to the first lab.

Laboratory Schedule

Lab Day	Experiment
August 21st	Check-in, #1: Measuring Uncertainty and Density of a Metal
August 28th	Lab #2: Preparation of Alum, Prep NaOH
September 4th	Lab #3: Standardization of NaOH Lab #4: KHP Analysis
September 11th	Lab #5: Visible Spectrum and Atomic Emission
September 18th	Lab #6: Molecular Models / Computational Chemistry
Septermber 25th	Lab #7: Molar Mass of a Volatile Solution
October 2nd	NO LAB – FALL BREAK
October 9th	Lab #8: Freezing Point Depression
October 16th	Lab #9: Thermochemistry
October 23rd	Lab #10: Gaseous Equilibrium
October 30th	Lab #11: Aqueous Equilibrium
November 6th	Lab #12: Acid, Bases and Buffers
November 13th	Lab #13: Thermodynamics and the Solubility of Borax
November 20th	Lab #14: Kinetics - Concentration Effects Lab #15: Kinetics - Temperature Effects Check-out
November 27th	NO LAB – Thanksgiving
December 4th	NO LAB