

**CHM 115**  
**ADVANCED GENERAL CHEMISTRY / F13**  
Section 001

**Prof. Andrew J. Pounds, Ph.D.**

Office: Rm. 105 Willet Science Center, (478) 301-5627  
e-mail: pounds\_aj@mercer.edu  
Alt. Phone (SMS) : (478) 227-3444  
Office Hours: M 3:00-6:00 (or by appointment)

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 101  
R 8:25–9:15 a.m., WSC Room 310  
Lab: R 9:25 a.m – 12:05 p.m., WSC Room 308

**Course Materials**

*Principles of Modern Chemistry*, Oxtoby, Gillis, and Campion 7<sup>th</sup> ed.,  
Laboratory Notebook (numbered, carbonless pages, available at bookstore)  
Scientific Calculator  
Approved Safety Glasses/Goggles  
Lock (for lab drawer)

**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
<hr/>	
Total Possible	1000 pts

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

<b>A</b>	≥900 pts
<b>B</b>	≥800 pts
<b>C</b>	≥700 pts
<b>D</b>	≥600 pts
<b>F</b>	<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 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 ADA/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."

## Tentative Class Schedule<sup>1</sup>

Week Starting	Chapter Sections	Lecture and Problem Solving Topics
August 18 <sup>th</sup>	Appendices A-C 1.1–1.4	Mathematical Preliminaries Foundations of Modern Chemistry
August 25 <sup>th</sup>	2.1–2.6 3.1–3.2	Stoichiometry Molecular Representation The Periodic Table
September 1 <sup>nd</sup>	3.1–3.18	<b>LABOR DAY #1 (9/2)</b> Classical Bonding Theory, Lewis Diagrams, VSEPR
September 8 <sup>th</sup>	4.1–4.6	Quantum Mechanics - Foundations <b>EXAM #1 (9/11)</b> Bohr Model Schrödinger Equation
September 15 <sup>th</sup>	5.1–5.5 6.1–6.13 7.3–7.4, 8.4	Quantum Mechanics - Atomic and Molecular Structure LCAO Theory and Valence Bond Theories Applications
September 23 <sup>rd</sup>	9.1–9.7  10.1–10.6	<b>EXAM #2 (9/25)</b> Gas Laws Kinetic Theory of Gases, Real Gases Bulk Properties and Intermolecular Forces
September 29 <sup>th</sup>	11.1–11.7	Solutions <b>FALL BREAK</b>
October 6 <sup>th</sup>	12.1–12.7	Thermodynamics <b>EXAM #3 (10/9)</b> Heat Capacity Enthalpy
October 13 <sup>th</sup>	13.1–13.7  14.1–14.2	Entropy, Spontaneity Thermodynamic Equilibrium and the Gibbs Free Energy Chemical Equilibrium Law of Mass Action
October 20 <sup>th</sup>	14.3–14.8	Equilibrium Calculations Heterogenous Equilibrium <b>EXAM #4 (10/25)</b>
October 27 <sup>th</sup>	15.1–15.4	Acid-Base Theory The pH Scale Acid/Base Equilibrium
November 3 <sup>rd</sup>	15.5–15.8  16.1–16.3	Buffers and Titrations Polyprotic Acids Solubility
November 10 <sup>th</sup>	16.4–16.5  17.1–17.5	pH and Solubility Complex Ions and Solubility Redox Reactions Electrochemical Cells, Faraday's Laws, and Cell Potential Concentration Effects
November 17 <sup>th</sup>	17.6–17.7  18.1–18.2	Batteris, Fuel Cells, and Corrosion <b>EXAM #5 (11/20)</b> Chemical Kinetics Rate Laws
November 24 <sup>th</sup>	18.3–18.4	Reaction Mechanism <b>THANKSGIVING BREAK</b>
December 1 <sup>st</sup>	18.5–18.8	Temperature Dependence Kinetic Theories and Activation Energy, Catalysis
December 7 <sup>th</sup>		<b>FINAL EXAM, 12/14/13, 9 a.m.</b> (Saturday)

<sup>1</sup>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 and instructions are available at: <http://theochem.mercer.edu/chm115>.

The lab manual pdfs SHOULD NOT be printed and placed in your notebook. 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 yellow copies from your notebook. All Lab reports must have a "Generalized Lab Report Form" cover page. Data and observations MUST be written in your notebook, not on the lab report form. Due **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 attempt to schedule a special accommodation. Students will not be penalized for laboratories missed due to excused absence (as defined below – up to a limit of two 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 two 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 are only two sections of CHM 115, both with labs on the same day, 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. Unexcused lab absences will result in a zero grade for the lab. In the event that a student is granted an excused absence and data is unavailable, the average of their other lab grades will be used to compute the missing grade. Students who have an excused absence for a University sanctioned event still must notify Dr. Pounds if they are going to miss lab. Missing more than two labs, excused or unexcused, will result in a failing grade in the course.

### Laboratory Grading:

There will be 15 pre-lab exercises (5 pts each) and a 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 115. 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 2 December 2013. 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 22 <sup>nd</sup>	Check-in, Toledo Exam, Lab #1: Density of a Metal
September 29 <sup>th</sup>	Lab #2: Preparation of Alum, Prep NaOH
September 5 <sup>th</sup>	Lab #3: Standardization of NaOH Lab #4: KHP Analysis
September 12 <sup>th</sup>	Lab #5: Visible Spectrum
September 19 <sup>th</sup>	Lab #6: Molar Mass of a Volatile Liquid
September 26 <sup>th</sup>	Lab #7: Freezing Point Depression
October 3 <sup>rd</sup>	NO LAB – FALL BREAK
October 10 <sup>th</sup>	Lab #8: Thermochemistry of Reaction
October 17 <sup>th</sup>	Lab #9: Gaseous Equilibrium
October 24 <sup>th</sup>	Lab #10: Aqueous Equilibrium
October 31 <sup>st</sup>	Lab #11: Acids, Bases, and Buffers
November 7 <sup>th</sup>	Lab #12: Borax Solubility
November 14 <sup>th</sup>	Lab #13: Electrochemistry
November 21 <sup>st</sup>	Lab #14: Kinetics - Concentration Effects Lab #15: Kinetics - Temperature Effects Check-in
November 28 <sup>th</sup>	NO LAB – Thanksgiving
December 5 <sup>th</sup>	NO LAB

### 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.