

**The Syllabus  
Chemistry 1145 B  
Fall Semester 2007**

Instructor: Ms Jessica Orvis  
 Class: TR 12:30 – 1:45, Chemistry 2240  
 Lab: Monday 8 – 11 am, Chemistry 1201/1240  
 Office: Chemistry 2215 and Chemistry 2207  
 Office Hours: Monday 3:15 – 4:00 pm, T – F 2:00 – 3:00 pm or by appointment  
 Phone: 681-5870  
 Email: JessOrv@georgiasouthern.edu  
 Text: *Chemistry 4<sup>th</sup> ed.* by Silberberg  
 Lab Text: Laboratory Manual for Chemistry 1145 2007 – 2008 edition  
 Required Supplies: Safety glasses or goggles and calculator, MasteringChemistry access, scantron 1712 for exams

Course Objectives for Chemistry 1145 include the following. Students will

- Develop a suitable knowledge of the vocabulary of chemistry
- Explain chemical and physical properties using the periodic table
- Explain chemical and physical properties of macroscopic materials in
- Terms of microscopic (atomic and molecular) structure.
- Describe chemical and physical properties of materials based upon their quantum structure.
- Deduce shapes of molecules based upon their electronic structure.
- Relate physical properties of materials to the shape of the constituent molecules.
- Perform quantitative stoichiometric calculations interchangeably using mass, moles, volumes, etc.
- Demonstrate an awareness of the role of chemistry in everyday life
- Collect and analyze scientific data, formulate conclusions, and communicate findings
- Apply rules of laboratory safety
- Employ critical thinking and systematic methods to solve problems, including conceptual and quantitative problems.

| <i>Week of</i> | <b>Tentative Chapter Coverage</b>                           | <b>Lab</b>                                     | <b>Stress of the Week</b> |
|----------------|---|--|---------------------------|
| Aug 13         | Introduction and Chapter 1: Keys to Understanding Chem.     | None   | No Stress                 |
| Aug 20         | Chapter 1 and Chapter 2: The Components of Matter           | Check-in and the Safety Lab                    | Quiz 1 (T)                |
| Aug 27         | Chapter 2 and Chapter 3: Sections 3.1 and 3.2               | Fun with Measurement                           | Hwk due (F)               |
| Sept 3         | Chapter 3 and Chapter 5: Gases and Kinetic Molecular Theory | Labor Day- No Lab (lab points on pre-lab)      | Exam 1 (T)                |
| Sept 10        | Chapter 7: Quantum Theory and Atomic Structure              | Separation of a Mixture                        | Quiz 2 (T)                |
| Sept 17        | Chapter 8 and Chapter 9: Models of Chemical Bonding         | Exploring the Nature of Matter—an Internet Lab | Hwk due (F)               |
| Sept 24        | Chapter 9   | A Study of Gases                               | Exam 2 (T)                |

|        |   |  |             |
|--------|---|--|-------------|
| Oct 1  | Chapter 10: Shapes of Molecules                   | Vapor Pressure Lab   | Quiz 3 (T)  |
| Oct 8  | Chapter 12: Intermolecular Forces                 | Introduction to AA   | Hwk due (F) |
| Oct 15 |   | Periodic Trends  | Exam 3 (T)  |
| Oct 22 | Chapter 12 and Chapter 13: Properties of Mixtures | Electrolytes and Solution Conductivity                           | Quiz 4 (T)  |
| Oct 29 | Chapter 13: Intermolecular Forces                 | A Study of Hydrates  | Hwk due (F) |
| Nov 5  | Chapter 13 and Chapter 12: Gases                  | Molecular Models   | Exam 4 (T)  |
| Nov 12 | Chapter 12 and Chapter 13: Liquids and Solids     | How to Determine Molecular Weight from Freezing Point Depression | Quiz 5 (T)  |
| Nov 19 | Chapter 13 and Thanksgiving Break!!               | No Lab   | Hwk due (F) |
| Nov 26 | Chapter 13 and review                             | Check-out  | No stress   |

**\*\*\*\* Tuesday, Dec 4<sup>th</sup> , 12:30 – 2:30 pm FINAL EXAM**

**Course Objective**

Students are introduced to the basic topics of chemistry, emphasizing chemical structure. Beginning with the atom, the course evolves to a consideration of chemical bonding, intermolecular forces, and phase changes.

**Grades**

There are 4 exams worth 100 points each, 5 quizzes worth 20 points each. The labs are worth 20 points apiece. The introductory lab is worth 5 points. Group work is worth 50 points. There will be five MasteringChemistry homeworks worth 20 points each. The final is worth 200 points and the grand total is equal to 1095 points.

|   |                  |
|---|------------------|
| A | 986 – 1095 (90%) |
| B | 876 – 985 (80%)  |
| C | 767 – 875 (70%)  |
| D | 657 – 766 (60%)  |
| F | < 657 (<60%)     |

**Group Work**

From time to time, class work will be collected and assigned points. These will be collected at the whim of the instructor. You must be present in class to receive points for group work.

**Homework on MasteringChemistry**

Homework assignments will be given from the MasteringChemistry website. A handout on the first day of class will instruct you on the registration process. There is no charge. The assignments will be due on dates announced in class. Late assignments will be docked points.

### **Quizzes and Exams**

All of the exams and quizzes are scheduled for Tuesdays of the week listed. The quizzes are short and will be given at the very beginning of the class. If you are late to class, you will be late to the quiz and will receive no additional time for the quiz. Class will follow the quiz. The exams are given for the full class period. There are no make-up quizzes or exams.

Quizzes will cover material from one quiz or exam to the next. Exams will cover material covered since the last exam. The coverage for quizzes and exams will be announced in class. You need to be on time to class to make sure that you hear all of the announcements.

No exam or quiz scores will be dropped, however I will substitute your weighted final for your lowest quiz or exam to help make up for a bad quiz day.

Note- Material from this course is included on the final exam for CHEM 1146. Study accordingly.

### **Missing Quizzes, Exams, and Labs**

There are no dropped grades. If you have to be absent due to illness, family emergency, etc., you will be allowed to substitute a quiz average for the missed grade. This can happen only once in the semester. Please consult with me regarding any absences so that I can ensure that you don't fall behind. An excused absence from lab will result in a makeup assignment.

### **Academic Integrity**

I will prosecute to the fullest extent allowable in the event of academic misconduct. A grade of "F" in the course will be received in the event of academic misconduct which includes the following: copying material in lab, copying the prelab from the work of other students, looking at the quizzes or exams of others during class, etc. Please consult the Student Conduct Code.

### **Attendance**

I have no attendance policy, but you should know that there is a strong correlation between good grades and good class attendance.

### **Professionalism Issues**

A good attitude is important in a class and laboratory such as this one. I expect to witness this in all of you at all points during the course. This will be a factor in determining borderline grades. Please turn off all portable communication devices before entering the classroom. They create a disturbance. Violators of this policy may be asked to leave the classroom.

### **End of Chapter Material You Need to Master For Exams and Quizzes**

I don't collect it or grade it, but I would be happy to go over any of your work with you. The following end-of-chapter problems will best prepare you for quizzes and exams.

Chapter 1: 26 – 41, 44 – 55, 60 – 65, 77 – 82, 84, 87 – 93.

Chapter 2: 3 – 4, 34 – 48, 50 – 52, 54 – 75, 76 – 111, 135.

Chapter 3: 1 – 2, 8 – 17, 22 – 29, 33 – 46.

Chapter 5: 3 – 4, 6 – 7, 20 – 33, 38 – 50, 62 – 63, 69 – 70, 75 – 78, 85, 87, 88, 128.

Chapter 7: 1 – 2, 7 – 16, 20, 46, 48, 49 – 52, 55 – 60, 64 – 65, 67.

Chapter 8: 11 – 36, 39 – 44, 46 – 48, 53 – 60, 68 – 87.

Chapter 9: 4 – 25, 39 – 40, 48 – 68.

Chapter 10: 2 – 22, 26 – 49, 52 – 58, 62 – 66.

Chapter 12: 7 – 10, 15, 18, 28, 30 – 34, 37 – 55, 72 – 74, 103, 129.

Chapter 13: 3 – 4, 9 – 14, 17 – 23, 41 – 43, 56 – 77, 84 – 86, 88 – 105, 117 – 118, 123, 126, 136.

## Final Word

Please let me know if you are having problems with class material. It can be enormously difficult to catch up once you get behind. I'm more than happy to work with you in my office and to make various study suggestions. Remember that I am available at times other than my office hours for help.

## Tips for Success

1. Attend all classes. The quizzes and exams are based mostly on material that is covered in class. You must be present to know what is going on!
2. Do not wait until the night before the exam or quiz to begin studying. You should practice chemistry at least an hour or so a day.
3. Be on time to class. Quizzes are given at the start of class and you risk missing it altogether if you are late. Announcements are also given at the start of class.
4. Do not wait until we have finished covering a chapter before working on chapter problems. Read one section and begin doing the problems pertaining to that section.
5. Come to see me when you start to run into problems. I am the most underutilized resource available to you! I will be happy to work with you to see where your problems are and to offer solutions.

## Laboratory Policies

The Laboratory Dress Code is mandatory for all Chemistry labs. Students who do not comply with the Laboratory Dress Code will not be permitted to participate in laboratory assignments. Lab instructors will decide whether or not a student is in compliance with this Laboratory Dress Code

- A. Safety glasses or goggles approved by the lab instructor.
- B. Closed shoes - toes & heel must be covered
- C. Legs covered to the ankle
- D. Shirt or blouse must have sleeves
- E. No exposed midriffs

This code establishes the minimum level of personal protection required by the Chemistry department. Students must wear additional protection as directed by their laboratory instructor based on the experiment or chemicals at hand.

1. Laboratory Attendance: There are two kinds of absences: excused and unexcused.

If the absence is unexcused, the student receives a "0" for the missed laboratory exercise. (*applies to first three absences*)

If the absence is excused, the student must make-up the missed work by completing a makeup laboratory experiment to be done during the last week of class. (checkout time)

If a student misses a fourth laboratory session (excused, unexcused or any combination thereof), the student earns a zero for the laboratory portion of the course. *Justification:* A student missing four laboratory sessions has missed one third of the laboratory exercises. As a result the student has not been sufficiently exposed to chemical methods, and furthermore, because chemistry is a "hands on" science, the student should get no credit for the laboratory portion of the course.

2. You must bring goggles or safety glasses to lab each week. You will not be allowed to work in the laboratory without them. You must wear them to enter the laboratory. You may borrow a pair of lab glasses for a fee of one dollar. The money goes toward the student chemistry club. You will present an ID and a dollar to the stockroom manager to receive a pair of safety glasses for the lab period.
3. If you are not wearing your laboratory goggles or safety glasses, we will remind you to put them on once. If we have to remind you a second time, 2 points will be removed from your lab grade. A third violation will result in eviction from the laboratory.
4. You must be on time to lab. If you are late to lab, you will lose 2 points from the lab for every 5 minutes late. At fifteen minutes after the hour, you will not be allowed into the lab. You must be present for the prelab discussion which includes safety information. Absence from this discussion will result in a zero for the lab grade.
5. You must be appropriately dressed for lab at all times. See the dress code above.
6. Prelaboratory exercises are required for each laboratory and are due at the start of the laboratory period. They can be found online at the address found in the front of your laboratory manual. They are worth 5 points out of the 20 point lab grade.
7. Laboratory work will be due at the end of the lab session unless otherwise notified.
8. Cleaning up is part of your lab grade. If your work station is not cleaned or glassware not put away, then points will be deducted from your lab.

9. Dry-labbing (making up lab data without performing the experiment or copying old lab data from the lab reports of others) is considered a form of academic misconduct and will be treated accordingly.
10. If you must miss a laboratory period, please let me know. If you have an excused absence, you will be allowed to complete a makeup laboratory assignment, which generally involves some library work and paper writing.
11. You must check out of the lab, even if you drop the course. Failure to complete the checkout procedure will result in an incomplete "I" for the course. If you drop the course and fail to check out, attempts will be made to put a hold on your grades.
12. We have a three hour time slot for the laboratory period. Come prepared to take as much of that time as you need to finish the lab and to have all of your questions answered. Lab time is study time. Don't waste it.

## Learning Outcomes

### CHEM 1145

Students will be able to

- Define features of the states of matter
- Show the nature of potential and kinetic energy and their interconversion
- Use common units for length, volume, mass, and temperature
- Use significant figures correctly and round appropriately
- Distinguish between accuracy and precision
- Use conversion factors in calculations
- Use density in calculations
- Classify matter
- Define element, compound, heterogeneous/homogenous mixtures
- Understand significance of mass laws
- Know postulates of Dalton's Theory
- Know contributions of major experiments of Thomson, Millikan and Rutherford
- Understand basic structure of the atom
- Classify the periodic table by groups, rows, metals, etc.
- Understand essential features of ionic versus covalent bonds
- Name and write formulas for ionic compounds
- Name and write formulas for binary covalent compounds
- Use atomic notation to designate atomic structure
- Understand isotopes and their designation
- Calculate atomic mass from isotopic composition
- Predict ion formation from the periodic table
- Calculate the molar mass of a compound
- Understand and use the concept of the mole
- Calculate grams from moles and moles from grams
- Calculate numbers of ions/atoms/molecules using Avogadro's Number
- Use mass percent to find empirical formula
- Use empirical formula to find mass percent
- Know how gases differ from liquids or solids
- Understand the meaning of pressure and use units appropriately
- Reduce the ideal gas law to individual gas laws
- Use the ideal gas law to calculate molar mass and density
- Use Graham's Law to solve problems of gaseous effusion
- Use Dalton's Law of partial pressures
- Relate mean free path, molecular speed, and collision frequency
- Understand why intermolecular attractions and molecular volume cause gases to deviate from ideal behavior
- Use postulates of kinetic molecular theory to explain gas behavior
- Understand the meanings of effusion and diffusion and how molar mass is related
- Interconvert wavelength and frequency
- Calculate the energy of a photon from frequency
- Determine quantum numbers and sublevel designations
- Be able to write quantum numbers to represent an electron
- Understand how particles and waves are different
- Understand basic postulate of quantum mechanics
- Understand concept of absorption and emission
- Understand quantization of energy
- Show how Bohr's Theory explains line spectra
- Understand how the uncertainty principle limits knowledge of electron properties
- Understand how periodic law is related to arrangement of electrons

Understand the reason for the spin quantum number  
Use orbital diagrams to designate quantum numbers for any electron  
Write full and condensed electron configurations  
Use periodic trends to rank elements by size and first ionization energy.  
Identify elements from successive ionization energies  
Understand how outer electron configuration is related to chemical behavior  
Use Lewis dot symbols to depict main group atoms  
Show formation of ions using Lewis dot structures, electron configurations, and orbital diagrams  
Rank covalent bonds by length and strength  
Determine bond polarity using electronegativity values  
Understand role of delocalized electrons in metallic bonding  
Understand how lattice energy is ultimately responsible for formation of ionic compounds  
Understand how a reaction can be considered as bond breaking and bond forming steps  
Use a stepwise method to draw Lewis dot structures of molecules  
Write resonance structures for molecules or ions  
Calculate formal charge of any atom in a molecule or ion  
Predict molecular shape from Lewis structures  
Use molecular shape and electronegativity values to predict direction of molecular polarity  
Use formal charge to predict "best" Lewis structure  
Understand the octet rule and major exceptions  
Understand why double bonds and lone pairs lead to deviations in ideal bond angles  
Use molecular shape to predict hybrid orbitals used by a central atom  
Describe the main ideas behind valence bond theory  
Understand the meaning of vapor pressure and its relationship to temperature  
Understand how to read a phase diagram  
Understand the distinction between bonding and intermolecular forces  
Understand capillarity, surface tension and viscosity and how intermolecular forces play a role  
Be able to identify types of intermolecular forces and their relative strengths  
Understand how macroscopic properties of water arise from hydrogen bonding  
Understand the meaning of a crystal lattice and the characteristics of three types of cubic unit cells  
Be able to predict relative solubilities from intermolecular forces  
Use Henry's Law to calculate solubility of a gas  
Express concentration in molarity, molality, parts by mass, parts by volume, and mole fraction  
Interconvert concentration units  
Use the dilution equation  
Explain how to make solutions that have certain concentrations  
Determine boiling point elevation and freezing point depression  
Use colligative properties to determine molar mass  
Understand the distinction between electrolytes and nonelectrolytes  
Understand the relationship between temperature and solubility of gases  
Understand the dependence on colligative properties of number of dissolved particles  
Understand how intermolecular forces stabilize structures of proteins, DNA, and cellulose  
Distinguish between saturated, supersaturated, and unsaturated solutions