

# SYLLABUS: SPRING 2014

## GENERAL CHEMISTRY I – CHEM 201 FH2

### HARRY S TRUMAN COLLEGE

*“Our mission dedicates us to deliver high-quality, innovative, affordable and accessible educational opportunities and services that prepare students for a rapidly changing and diverse global economy.”*

#### Faculty Information

Instructor: Roksana Begum, Ph.D.  
Office Location: Rm # 3832 (before 2:00 pm) or 3161 (after 2:30 pm), Mon through Thu  
Office Hours: Monday and Wednesday, 12:45pm – 1:15 pm (Rm # 3832)  
Mailbox Location: Rm # 3824  
Phone : (773)-907-4498 (work), after 2:30 pm, Mon through Thu  
E-Mail: [rbegum@ccc.edu](mailto:rbegum@ccc.edu)

#### Class Meets

Tuesday: 9:00 am – 12:40 pm , Rm # 3831

Thursday: 9:00 am – 12:40 pm , Rm # 3833

**Break: 10-15 minutes, given when appropriate.**

#### Course Catalog Description

Topics include the periodic table of the elements, atomic structure, basic concepts of quantum theory, bonding, stoichiometry of compounds and reactions, thermochemistry, the gaseous state, basic concepts of the liquid and solid states, solutions, acids and bases. Writing assignments, as appropriate to the discipline, are part of the course.

**Credit hours:** 5

**Contact hours:** 4 lecture hours and 4 lab hours per week based on sixteen weeks.

**Course Prerequisites:** Eligibility for Mathematics 140 or higher and either Grade of C or better in Chemistry 121 or one year of high school chemistry, or consent of department chair.

#### Required Textbooks

**Chemistry: A Molecular Approach 3rd Ed.** by Nivaldo J. Tro, Pearson ©

Beck's bookstore has an edition of this textbook with only the chapters needed for Chemistry 201. This is useful for students who do NOT plan to take Chemistry 203.

All lab instructions (handouts) will be provided or posted on the blackboard. You are responsible for collecting printout and reading the instructions prior to attend the lab.

#### Required Supplies

Every day you must bring Pens (blue or black), Pencils (2B) and a Scientific Calculator.

Points (-2) will be taken off if the instructor needs to provide any of these. Phone calculator and Laptop calculator will not be permitted

## Attendance

You are expected to attend all labs and lectures. If you miss any class, you are responsible for knowing all information and material presented in that class.

You must sign in a sign-in sheet, everyday!

## Homework

Assigned in MasteringChemistry with a deadline:

- ◆ Multiple choices, short answer questions and problem solving.
- ◆ Maximum time limit scheduled: one week.
- ◆ Automatically scored.
- ◆ Maximum 10 submissions possible.
- ◆ Last submitted score added to the Gradebook.
- ◆ Must submit within the deadline.
- ◆ Lowest homework score is dropped.
- ◆ No credit is given if submitted after deadline.

## Quizzes

- ◆ Multiple choices, short answer questions and problem solving.
- ◆ Time limit: 15-20 minutes.
- ◆ Usually given at the beginning of the class session.
- ◆ Messy and incomplete answer will carry zero point.
- ◆ Lowest quiz score is dropped.
- ◆ **No make-up quizzes** under any circumstances.
- ◆ **Points are taken off for not writing student name (-2)**

## Labs

- ◆ Each experiment of worth 20 points.
- ◆ Report due on the *same day or Next lab day*.
- ◆ 50% credit is given for one-week overdue report and 0% credit after that.
- ◆ Data & calculation must be written **with a pen (blue or black)**. No pencil and whiteout can be used.
- ◆ Must HAVE instructor's signature on the final data and calculation before you leaving the classroom (Very important!!!).
- ◆ **Points (-2) are taken off for messy lab report and using pencil and whiteout.**
- ◆ **Points are taken off for not writing student name (-2) and for missing sample (if any) information (-2)**
- ◆ Lowest lab score is dropped.
- ◆ **NO MAKE-UP LABS!** Lab coordinator removes lab material at the end of each lab.

## Breakdown of 20 Points of Each Lab Report

- ◆ Prelab & Postlab Questions: 5
- ◆ Data & Calculation & result: 10
- ◆ Active participation: 2
- ◆ Lab Safety & Waste disposal: 1
- ◆ Lab station tidy-up: 2

**You will work with a partner but each of you should submit separate lab report on your own words.**

## Exams

- ◆ Three non-cumulative exams (Exams I , Exam II and Exam III), each at worth 50 points.
- ◆ Lowest exam score of Exam I , II and III is dropped.
- ◆ **Final Exam** given by the department. **You must pass the Final Exam in order to pass the course.**
- ◆ **NO MAKE-UP EXAM** under any circumstances.

## Extra Credit

**You may earn 5% extra credit from Attendance, Open-book quizzes and Practice Exams.**

## Course Evaluation:

### Mid-term letter grade

- ◆ Homework , 10% weight
- ◆ Quizzes, 10% weight
- ◆ Labs, 20% weight
- ◆ Exam , 60% weight
- ◆ Extra Credit (2.5%)

### Final letter grade:

- ◆ Homework , 10% weight
- ◆ Quizzes, 10% weight
- ◆ Labs, 20% weight
- ◆ Exams I, II and III, 4 (40% weight)
- ◆ Final Exam (20% weight)
- ◆ Extra credit (5%)

### Weight Distribution for Letter Grade

90 %	A
80 %	B
70%	C
60%	D
< 60%	F

## Classroom Safety

You must obey the instructions of the “**Lab Safety Contract**” during lab sessions.

The following are my main concerns:

- Using goggles
- Secured hair
- Proper clothing and shoes

## Reminders!

◆ **Blackboard:** <http://ccc.blackboard.edu>.

You must check blackboard announcements very often especially, on **Monday and Wednesday** nights.

◆ **April 7<sup>th</sup>:** Last day of student initiated withdrawal

◆ **Cell Phone and Other Electronic devices**

- If cell phones, pager etc., causes a disruption in the class they will be taken up until the end of the class session.
- Laptop cannot be used for web surfing.
- No text messaging during class session.

## Active Pursuit

Students are not actively pursuing the course objectives will be administratively withdrawn (ADW) at midterm if at least two of the following apply:

- Less than 70% of assignments up to the midterm have been completed.
- Less than 70% of quizzes and tests up to the midterm have been attempted.
- Less than 70% of class sessions up to the midterm have been attended.

## Academic Integrity

The CCC has no tolerance for violations of academic integrity. The student policy manual states, "Plagiarism and cheating of any kind are serious violations of these standards and will result, minimally, in the grade of 'F' by the instructor" (39). All course work will be checked for Academic Integrity. **In this course, the first violation will result in an "F" for the assignment; the second violation will result in course failure.** Make-ups and revisions are not available after an infraction of academic integrity.

## Learning Outcomes for Chemistry 201

At the completion of this course, the successful student will be able to:

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Solve quantitative chemistry problems and demonstrate reasoning clearly and completely. Integrate multiple ideas in the problem solving process.

- Describe, explain and model chemical and physical processes at the molecular level in order to explain macroscopic properties.
- Classify matter by its state and bonding behavior using the Periodic Table as a reference.
- Apply important theories such as the Kinetic Molecular Theory of Gases or the Quantum Mechanical Theory of the Atom to the solution of general chemistry problems.
- Perform general chemistry laboratory experiments using standard chemistry glassware and equipment and demonstrate appropriate safety procedures.
- Record, graph, chart and interpret data obtained from experimentation and use that information to correctly identify/analyze assigned unknown substances.

## Course Objectives

At the completion of this course, the successful student will be adequately prepared to take the subsequent course: General Chemistry II (Chemistry 203), and be able to do the following:

**Topics marked with (R), review, should have been covered by the student in a Basic Chemistry course.**

### Scientific Method

- (R) Describe the scientific method.
- (R) Define and explain the terms: law, hypothesis, and theory.

### Chemical Calculations

- (R) Use exponential notation.
- (R) Do mathematical calculations involving significant figures.
- (R) Differentiate between mass and weight.
- (R) Convert from the English system to the metric system (& vice versa) common units of length, mass, volume, and temperature.
- (R) Use the metric system in calculations.

### Heat and Temperature

- (R) Differentiate between heat and temperature.
- (R) Do simple calculations of heat changes using specific heat.
- Define and use the terms standard state, standard enthalpy change, molar enthalpy of formation.

### Density

- (R) Solve problems using density as the relationship between mass and volume.

### Properties of Matter

- (R) Use and define (describe or explain) basic chemical concepts with respect to properties of matter: physical states of matter, physical and chemical properties of matter, physical and chemical changes, the law of conservation of mass, the law of conservation of energy, the law of definite composition, classification of elements.
- (R) Distinguish between pure substances (elements and compounds) and mixtures (homogeneous and heterogeneous).
- List the names and chemical symbols of at least 48 elements.

### Atomic Theory and Structure, Molecular Theory and Structure

- (R) Distinguish between ionic and molecular compounds.
- (R) Determine the number and types of atoms represented in a chemical formula.
- Use basic chemical nomenclature for inorganic compounds.
- Write the formulas of binary ionic compounds, common binary molecular compounds, and at least 12 common acids, 4 common bases, inorganic ternary compounds using 15 common polyatomic ions.
- Use oxidation numbers to distinguish oxidation states of metals in compounds.
- (R) Balance chemical equations given the formulas of the reactants and products.

- Calculate the oxidation number of each element, given the formulas of the reactants and products.
- Balance redox equations using oxidation numbers.
- (R) List the basic principles of Dalton's atomic theory and indicate how the theory has been further developed in this century.
- (R) State the basic properties of the subatomic particles: protons, neutrons, and electrons.
- (R) Describe the Rutherford atom.
- (R) Define atomic number, mass number, and isotopes.
- (R) Define the atomic mass unit and Avogadro's number.
- (R) Use the conversion factor from grams to amu in simple calculations.
- Calculate the average atomic mass from isotopic masses and percent abundances.
- (R) Apply the terms: metals, nonmetals, alkali metals, alkaline earth metals, metalloids, transition metals, noble gases, halogens, and inner transition metals to the arrangement of elements in the periodic table.
- (R) Describe the arrangement of the elements in the periodic table.
- (R) Use the periodic table to predict formulas of compounds.
- (R) Define the terms anion, cation, and polyatomic ion.
- Describe how ionic and covalent bonds are formed.
- Calculate the oxidation number of each element in a chemical formula.

### **Mole-Mass Calculations**

- (R) Calculate the percent composition of compounds, given the formulas.
- (R) Calculate the empirical formula, given the percent composition.
- (R) Calculate the empirical formula of compound given the mass of the sample, the mass of  $\text{CO}_2$  and mass of  $\text{H}_2\text{O}$  produced in a combustion reaction.
- (R) Distinguish between empirical and molecular formulas.
- (R) Explain the concepts of the chemical quantity, the mole, and relate it to counting of atoms and molecules.
- (R) Convert mass in grams to moles, formula units, molecules (and/or atoms) using atomic weights, formula weights, and molecular weights.
- List the basic rules which predict whether a salt is soluble in water.

### **Stoichiometry**

- Write the balanced equations describing several examples of combustion, acid-base, precipitation, and exchange reactions. Write the equations in the molecular, total ionic and net ionic format.
- (R) Explain the information given by the balanced chemical equations.
- Perform stoichiometric calculations from a given chemical equation.
- Use calculations determine the limiting reagent, how much excess reagent is left, and the theoretical and percentage yield of each product.

### **Solutions**

- List the properties of solutions and distinguish true solutions from heterogeneous and colloidal mixtures.
- Define solubility, percent concentration, molarity, mole fraction, and molality.
- Explain factors affecting solubility and the rate of dissolving.
- Write molecular, total ionic and net ionic equations which show that the solution is the reaction medium.
- Use percent concentration, molarity, and molality in stoichiometric calculations.

## Gases

- List the basic principles of the Kinetic Molecular Theory of gases.
- (R) Describe the measurement of pressure using a barometer.
- (R) Use four kinds of pressure units in calculations and convert from one to another.
- Calculate pressure, volumes, and temperatures of gases using Boyle's law, Charles' Law, the Combined Gas Law, and Dalton's Law of Partial Pressures.
- (R) Calculate Kelvin temperatures from Centigrade and vice versa.
- (R) Define standard conditions of temperature and pressure.
- Use the Ideal Gas Law to calculate density and molecular weight of a gas.
- Use the gas laws in chemical stoichiometric calculations.
- Define and distinguish between diffusion and effusion.

## Energy and Light

- Define and explain the terms electromagnetic radiation, wavelength, frequency, wave amplitude, spectrum, and nodes.
- Describe the Bohr hydrogen atom; describe the hydrogen atom in terms of simple quantum mechanics.
- Perform calculations using the equation  $\lambda\nu = c$ .
- Explain the source of the atomic line spectra.
- Describe the properties of light.

## Molecular Orbital Theory

- Write electronic configurations of the first 50 elements; show the diagrams of their electronic structure, and indicate the spin of each electron.
- Sketch the shape of the s, p and d orbitals.
- Identify the 4 quantum numbers for any electron in an atom.
- Predict which atoms or ions are paramagnetic and which are diamagnetic using the electronic configurations.
- State the Pauli Exclusion Principle, Hund's rule, and the Aufbau principle.
- (R) Define ionization energy and be able to rank using the periodic table.
- Use ionization energy trends to predict the stability of electronic configurations and the tendency for outer shell electrons to undergo changes in order to form compounds.
- (R) Define electronegativity: show how it varies with respect to the periodic table.
- (R) Use electronegativity to estimate the polarity of bonds.
- Show the trends of atomic and ionic sizes on the periodic table.
- State the octet rule, including exclusions.
- Write Lewis electron dot structures for simple covalent compounds and polyatomic ions.
- Use double and triple bonds to show structures of molecules and ions; use resonance to describe equivalent bonds.
- Use the Valence Shell Electron Pair Repulsion theory to describe electron pairs geometry, molecular geometry, hybridization, and bond angles.
- Predict the polarity of bonds and molecules.
- Define bond order and bond dissociation energy; use bond energies to estimate reaction enthalpies.
- Calculate the formal charge of an atom in a molecule or ion, and use it to predict the most reasonable resonance structures.
- Explain the difference between oxidation number and formal charge.
- Explain simple valence bond theory.
- Use the concepts of orbital overlap, sigma and pi bonds, hybrid orbitals to explain the strength and orientation of covalent bonds.

## Properties of Solutions

- Use molarity in calculations concerning the dilution of solutions.
- Explain at least two examples of colligative properties.
- Calculate the freezing point depression and the boiling point elevation due to the addition of a nonvolatile molecular solute to a pure solvent.

## Acids and Bases

- List at least four properties each for acids and bases.
- Explain the behavior of acids and bases in terms of the Arrhenius and Brønsted/Lowry theories.
- Write equations for acids and bases showing conjugated acid/base pairs.
- List at least five common strong acids and five common strong bases.
- Given an acid, write the formula of the conjugate base, and vice versa.
- Write complete equations for at least two examples of each of the following reactions: acid + base, acid + metal, acid + metal oxide, acid + carbonate.
- Given the formula of a salt, write the formulas of the acid and the base which would react to form the salt.
- Distinguish between electrolytes and non-electrolytes, strong and weak electrolytes. List at least three examples of each.
- Define pH. Given a pH value, state whether the solution is acidic, basic, or neutral.
- Given a pH value calculate the  $H^+$  concentration, and vice versa.
- Estimate pH and pOH values without the use of a calculator given  $H^+$  concentration and/or  $OH^-$  concentration.
- Given a pOH value calculate the  $OH^-$  concentration, and vice versa.
- Convert from  $H_3O^+$  concentration to pH then to pOH then to  $OH^-$  concentration.

## Laboratory and Evaluations

- Perform simple tasks in the laboratory. Perform ten laboratory experiments.
- Carry out laboratory measurements and calculations using the correct significant figures.
- Perform the necessary calculations, prepare any required graphs and answer the questions for each experiment.
- Achieve a grade of at least 50% for the final comprehensive examination.
- Record all data in ink directly onto the data sheet or in the laboratory notebook.
- Prepare a lab report including a summary.
- On any quizzes and exams answer short essay questions.

## Teaching and Learning Goals Established by Truman College

Taking a course in Chemistry helps a student achieve all of the following general education goals. How this occurs is explained below.

- Communicate effectively in both written and oral forms

Students will keep a laboratory notebook and learn to record careful observations, draw appropriate conclusions and reflect on what they have learned.

- Gather, interpret and analyze data

Students will learn to collect data in the laboratory, create graphs, compare quantitative data and draw conclusions about the data obtained.

- Demonstrate the ability to think critically, abstractly and logically

The Scientific Method is predicated upon deductive and inductive logical reasoning. Students will study applications of the scientific method to information gathered by the scientific community. Students will read articles about chemical discoveries. Abstract thinking is developed in many ways in chemistry from the use of symbols and models to the use of mathematics to solve a variety of problems.

- Work with a variety of technologies

Students use computers, data acquisition equipment, microscopes, digital imaging devices, media, the Internet, podcasts, digital balances, all in the pursuit of scientific knowledge.

- Exhibit social and ethical responsibility

This very serious goal is addressed on many levels in the chemistry course, from the discussion of the importance of careful and precise measurements that could affect the life of a patient to the discussion of what happened when the space ship Challenger exploded or a grain elevator explodes - we examine the role of responsible use of chemical knowledge.

- Perform productively in the workforce

Because Chemistry education is comprehensive in utilizing the body (kinesiology), the mind (both spatial and analytical reasoning) and the heart (looking at the connection of chemistry to the world) it is an excellent course to prepare individuals for the workforce.

- Demonstrate the ability to learn independently

Students are given independent projects to complete in the course. They are also given questions to research independently. Reporting these results to the class develops their ability to speak confidently to their peers.

- Gain awareness of their role in the global community

By discussing the way that chemistry is connected to other occupations and careers we develop student awareness about their career choice and its dependencies on a basic understanding of chemistry.

#### General Education Goals Established by Truman College

- **GEG1:** The student exhibits social and ethical responsibility and is aware of her or his place in the global community.
- **GEG2:** The student performs effectively in the workplace and has the ability to work and make effective use of a wide variety of current technologies.
- **GEG3:** The student communicates effectively in both written and oral formats.
- **GEG4:** The student demonstrates the ability to think critically, abstractly, and logically.
- **GEG5:** The student gathers, interprets and analyzes data.

#### Physical Science and Engineering Departmental Learning Outcomes

Upon graduation with an Associate degree from Truman College a student should be able to:

- Organize, analyze and interpret information and use the scientific method to make inferences.
- Exhibit knowledge of scientific concepts through written and oral communication.

- Demonstrate excellent laboratory skills and techniques including the proper use of relevant instruments and related technologies.
- Use the lexicon of science to explain abstract scientific concepts.
- Relate concepts learned in Physical Science and Engineering Department classes to real world situations.
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### **Academic Support Services**

- ◆ FERPA (Family Educational Rights and Privacy Act) is a federal law that protects the privacy of student educational records: <http://www.ed.gov/policy/gen/guid/fpco/ferpa/index.html>. Faculty cannot reveal information about students, or discuss student records over the phone or unsecure e-mail. CCC student e-mail meets FERPA requirements.
- ◆ The Student Services Department provides a broad range of services to assist students in achieving their academic and life goals.
- ◆ The Truman College Disability Access Center (DAC) verifies needs pursuant to the American Disabilities Act (ADA), determines student academic accommodations, and issues accommodation letters. Phone number: (773) 907-4725. Linda Ford is the director. The DAC is located in Room 1435, Main Bldg.
- ◆ The tutoring center is located in room 177, Larry McKeon Student Services Building, (773) 907-4785 or (773) 907-4790.
- ◆ TRIO is for low-income students, first generation college students, or students with disabilities who need academic support: (773) 907-4797, Room 1435, Main Bldg. Registration is required at the start of each semester.
- ◆ SSLI is for students who need various other support services to achieve their educational goals: (773) 907-4737, Room 1435, Main Bldg.
- ◆ The Wellness Center provides a variety of services at no cost for students including counseling, crisis intervention, support groups and more. (773) 907-4786, Room 1946, Main Bldg.

**CHEMISTRY 201 FH2, SPRING 2013, LECTURE AND LAB SCHEDULE**  
**CHEMISTRY: A MOLECULAR APPROACH, 3RD EDITION BY NIVALDO, J. TRO**

Date	Topic	Textbook Reference
	<b>LECTURE:</b> Course Introduction, Basic Chemistry Review Check-In, Lab Safety.	
01-14 Tue Rm 3831		Chapter 1
01-16 Thu Rm 3833	<b>Placement Assessment</b> <b>LECTURE:</b> Matter, Measurement and Problem Solving	Chapter 1
01-21 Tue Rm 3831	<b>Quiz-1 (Covers Ch-1, Lab safety and lab equipment)</b> <b>LECTURE:</b> Atoms and elements <b>LAB-1:</b> Densities of Liquids and Solids	Chapter 2
01-23 Thu Rm 3833	Ch-2 Cont'd <b>LECTURE:</b> Molecules, Compounds and Chemical Equations	Chapter 2 Chapter 3
01-28 Tue Rm 3831	<b>Quiz-2 (Covers Ch-2 &amp; 3)</b> Ch-3 Cont'd <b>LAB-2:</b> Separation of the Components of a Mixture/Paper Chromatography	Chapter 3
01-30 Thu Rm 3833	<b>LECTURE:</b> Chemical Quantities and Aqueous reactions	Chapter 4
02-04 Tue Rm 3831	<b>Ch-4 Cont'd</b>	Chapter 4
02-06 Thu Rm 3833	<b>LECTURE:</b> Problem Solving (stoichiometry) <b>Quiz-3 (Covers Ch-4)</b>	Chapter 4
02-11 Tue Rm 3831	<b>LAB-3:</b> Percent of Copper in a Compounds	
02-13 Thu Rm 3833	<b>LECTURE:</b> Chapter 4	Chapter 4
02-18 Tue Rm 3831	<b>Quiz-5 (Covers Ch-4)</b> <b>Review for Exam-1 , <u>Take-home Practice Exam-1 for Extra Credit</u></b> <b>LECTURE:</b> Redox Reactions	Chapter1-4
02-20 Thu Rm 3833	<b><u>Exam-1 ( Covers Ch-1 through Ch-4)</u></b>	Chapter1-4
02-25 Tue Rm 3831	Discussion on Exam-1, <b>LECTURE:</b> Gasses <b>Lab 3: Qualitative Analysis</b>	Chapter-5
02-27 Thu Rm 3833	<b>Lecture: Thermochemistry</b>	Chapter-6
03-04 Tue Rm 3831	<b>Quiz-6 (Covers Ch-5&amp;6)</b> <b>LAB-5: Heat Effects and Calorimetry</b>	Chapter -6
03-06 Thu Rm 3833	<b>LECTURE:</b> The Quantum Mechanical Model of the atoms	Chapter-7

03-11 Tue Rm 3831	Ch-7 Cont'd	Chapter 7
03-13 Thu Rm 3833	<b>Quiz-7 (Covers Ch-7)</b> <b>LAB-6:</b> Atomic Spectra of Hydrogen	Chapter 7
03-18 Tue Rm 3831	<b>LECTURE: Periodic Properties of Elements</b>	Chapter 8
03-20 Thu Rm 3833	Ch-8 Cont'd	Chapter 8
03-25 Tue Rm 3831	<b>Quiz-8 (Covers Ch-8)</b> <b>LAB-7:</b> The Alkaline Earth and Halogens	Chapters 8
03-27 Thu Rm 3833	<b>LECTURE:</b> Chemical Bonding I: The Lewis Model	Chapters 9
04-01 Tue Rm 3831	Ch-9 Cont'd <b>LAB-8:</b> The Geometrical Structure of Molecules <b>Review for Exam-2, <a href="#">Take-home Practice Exam-2 for Extra Credit</a></b>	Chapter 9
04-03 Thu Rm 3833	<b>Exam-2 (Covers Chapters 6-9)</b> <b><i>Last day of student initiated withdrawal is April 7<sup>th</sup></i></b> <b><i>Individual Student conference (12:40-1:40 pm)</i></b>	Chapters 6-9
04-08 Tue Rm 3831	<b>Discussion on Exam-2</b> <b>LAB-9:</b> Periodicity	Ch-6-9
04-10 Thu Rm 3833	<b>LECTURE:</b> Chemical Bonding II: Molecular shapes, Valence Bond Theory, and Molecular Orbital Theory	Chapters 10
04-15 Tue	<b>Spring Break</b>	
04-17 Thu Rm 3833	<b>Spring Break</b>	
04-22 Tue Rm 3831	<b>Ch-10 cont'd</b>	Chapter 10
04-24 Thu Rm 3833	<b>Quiz-9 (Covers Ch-10)</b> <b>LECTURE:</b> Liquids, Solids and Intermolecular Forces	Chapter 11
04-29 Tue Rm 3831	<b>Ch-11 Cont'd</b> <b>LECTURE: Solutions</b>	Chapter 12
05-01 Thu Rm 3833	Ch-12 Cont'd <b>Review for Exam-3, <a href="#">Take-home Practice Exam-3 for Extra Credit</a></b> <b>Lab 10:</b> Molar Mass by Depression of Freezing point	Chapter 12
05-06 Tue Rm 3831	<b>Exam-3 (Covers Chapters 10-12)</b> <b>Discussion on Exam-3</b> Review for Final Exam	
05-8 Thu Rm 3833	<b>Exam-4 (Comprehensive Final Examination)</b> <b>Begins at 10:00 am</b>	<b>Ch 1-12</b>

**This is a tentative schedule. Please keep posted for any changes.**

## **To succeed this course:**

- **READ**
- **UNDERSTAND**
- **MEMORIZE**
- **PRACTICE**

**All together spend at least 10-14 hrs/wk.**