University of Wisconsin-Eau Claire
CHEM 103: General Chemistry- Syllabus
Spring 2014

Lecture (Section 003)	**T/R, 2:00 PM– 3:15 PM, P 007**
Instructor	**Dr. Sudeep Bhattacharyay**
Lab (Sections 331/333)	**M/W, 9.00 – 11.50 AM, P 469 (*Bhattacharyay*)**
Lab (Sections 332/334)	**M/W, 9.00 – 11.50 AM, P 475 (*L. McEllistrem*)**
Office	**Phillips 455**
Office Phone	**836-2278**
Office Hours	**M/W (1:00 PM - 2:00 PM) or by appointment**
E-mail	**bhattas@uwec.edu**

Required Materials

Lecture Text
Julia Burdge and Jason Overby, Chemistry Atoms First, 1st Edition, McGraw-Hill, New York, 2012.

Calculator
Scientific calculator that is capable of executing typical mathematical operations (logarithms, exponential functions, etc.) and handling scientific notation. You should bring your own calculator to lecture and lab.

Lab Needs
CHEM 103 Lab manual: Obtain at the first lab meeting
Safety goggles (fit tight to face to meet ANSIZ87.1 standard) – available for purchase from bookstore

Course Description and Objectives
Chemistry is the study of transformation of matters. How do we perceive changes in matters? How do we study changes that occur at the particle-level, which can never be observed even with a microscope? Chemistry 103 is the first course in the freshman chemistry sequence that attempts to answer these questions as it takes us deep into the world of atoms and molecules. It intends to share the wealth of knowledge accumulated over many hundreds of years. It establishes the foundations for the subsequent courses in chemistry, and therefore a solid understanding of the important concepts in this course is essential for future studies in chemistry and other science courses. The *main goals* of this course are:

- Understand the particle-level nature of matter
- Understand the electronic-nature of bonding and how it contributes to various properties of molecules relating to changes
- Generate an ability to communicate knowledge

Each student is expected to master the following *principal course objectives*.

- Understand what constitutes a valid scientific argument.
- Understand the systematic approach to solve chemistry problems.
- Obtain a solid working vocabulary of chemical terms. The Glossary at the back of the textbook will be most helpful to you for reviewing.
- Be familiar with the names of the common elements and their chemical compounds, their symbolic representation and their common oxidation numbers. Be familiar with the periodic table.
- The writing and interpretation of chemical equations. Be able to carry out quantitative calculations for chemical reactions.
- Have ideas on the nature of the chemical bond and the resulting consequences.
- Have the basic ideas about electronic configurations of atoms and of atomic structure theory.
- Have an understanding of the basic molecular shapes and structures of simple molecules, and their relationship to observable properties.

Goals of the Baccalaureate Degree

This course is intended to help students develop the following:

- ❖ Knowledge of Evolution, Human Culture, and the Natural World
- ❖ Recognize Science as a Worldwide Collaborative Human Endeavor

Contributed by Many Generations

- ❖ Understanding Diversity in Society as a Natural Phenomenon
- ❖ Creative Critical Thinking
- ❖ Effective Communication

Active Learning through Workshops. The course will provide approximately 12-14 workshops (i.e. about one in each week) to help you to learn the practices mentioned above. Each workshop will be on specific topics and will consist of derivations, exercises, and solving some end-of-the-chapter problems. Many of these will be accomplished by group discussions. Prior to attending each workshop, you will need *reading a specific section of the book and coming prepared*. A brief lecture will be used to introduce the problem and to help class discussions.

Instruction for preparing workshop reports will be provided in the class. Briefly, each question of the workshop will need to be worked out with significant details. All exercises will be carried out in clean notebook pages, clearly showing mathematical formulae and explicit details of procedures to obtain certain quantities. Please remember that emphasis will be given *on the ways and methods of solving problems*, not just correct answers. Please plan to spend sufficient time on each workshop every week. The workshop will carry 20 points and its report will be graded. **All workshops must be completed to pass the course.**

Recommended Homework Problems
A list of recommended homework problems for each chapter is included in the tentative lecture schedule. All students are strongly encouraged to solve all of these problems. These will not be collected or graded, however, it will help you think critically and practice your problem solving skills. However, the assigned problems in the workshop will be graded.

Laboratory
The laboratory is an important part of the CHEM 103 course and will count 20% toward your course grade. All students are encouraged to go through the assigned lab material before the lab. Most experiments will be performed in pairs or groups, however, some in-lab practical exercises will be performed individually. Points will be awarded based on their overall performances in the lab that will include completion of required lab activities, post-lab assignments, and in-lab practical exercises. **Each student must complete all laboratory assignments to pass the course.**

Attendance
The university requests that the class attendance be monitored. Although, the attendance will not be used to determine your class grade, you are expected to attend all course lectures and labs. **ALL workshops and labs must be completed to receive a passing grade in the course.**

Policy of Absence
If you are absent on a workshop/lab for a valid reason including illness (medical record from a campus doctor) and/or academic presentation (letter from your professor), you will get a chance to make-up the lab/workshop.

Dropping/Withdrawing from class
The deadline for dropping this course with no record is 02/03/2014 and for withdrawing with a grade of W is 04/07/2014. You can get the complete information at http://www.uwec.edu/Registrar/calendar/Academic-Calendar.htm.

Office hours
I will be available for discussions between 1-2 PM on Mondays and Wednesdays. I would appreciate an email about your plans ahead of time.

Quizzes
There will be a short (~10-15 minutes) quiz each week except the exam weeks and will count ~10% toward your course grade. Quizzes will be announced and based on the material presented in the lecture, assigned reading, and recommended homework problems.

Exams
There will be total of four exams in this course. Three midterm exams will be given as outlined in the tentative lecture schedule (Exam 2 is comprehensive). The FINAL exam

will be comprehensive and is scheduled for **May 16** (8.00–9.50 AM). Exam questions will be based on all material covered in lecture and lab.

Academic Integrity
Academic misconduct in any portion of the academic work for a course is a serious offense. Students found guilty will be punished by a failing grade in the course. The disciplinary procedures and penalties for academic misconduct are described in the UW-Eau Claire *Student Services and Standards Handbook* in the section titled, "Chapter UWS 14 – Student Academic Disciplinary Procedures."

Students with Disabilities
Any student who has a disability and is in need of classroom accommodations, please contact the instructor and the Services for Students with Disabilities Office in Old Library 2136 at the beginning of the course.

Summary of Grading Scheme

Midterm exams:	300 points (100 x 3)	
Workshops	260 points (13 x 20)	
Quizzes:	100 points (20 x 5)	
Final exam:	200 points	
Lab:	190 points	(13 x 10 + 60 (practical))
Total:	**1050 points**	

The percentage required for a specific final grade:

Grade	Percentage	Grade	Percentage
A	90-100%	C	65-69.9
A-	88 -89.9	C-	62-64.9
B+	85-87.9	D+	59-61.9
B	75-84.9	D	54-58.9
B-	73-74.9	D-	50-53.9
C+	70-72.9	F	< 50%

Helpful Study Hints
1) Read the assigned section(s) of the text thoughtfully before they are discussed in the lecture.
2) Listen carefully to the lecture and take notes of important topics. Taking good notes during a class is an important part of study preparation.
3) Discuss with your classmates about topics that you are having difficulties to understand. I believe students can learn a lot through discussions with their classmates.
4) Work all the recommended end-of-chapter exercises. Think about the problem and your answer. Check your answers against those at the back of the book but DO NOT look at those before trying the problem.

5) FINALLY, please do not wait TOO LONG to get help. Don't hesitate to seek help from me if you are having any problem in understanding the lecture material. Feel free to drop me an email or simply stop by my office if you have any questions. One-to-one conversation is sometime helpful to understand the difficult topics.

Classroom Behavior

- ✓ Turn **off** cell phones when you come to class.
- ✓ Computer use in class should be connected with the class, and not other outside work.
- ✓ The class this semester will be large. Carrying out conversations in the middle of the lecture shows a lack of respect to other students in the class.

❖ Tentative Lecture Schedule for CHEM 103: Spring 2014 (C-1614)

Date	Lecture Topic (s)	Reading (Section)	Suggested Homework Problems
Introduction to Chemistry: Matter and Measurement			
Jan. 21-24	Matter & Measurement Uncertainty, Dimensional Analysis	Chapter 1	Chapter 1: 9, 15, 23, 25ae, 27, 29ab, 37. 39, 43, 45, 47, 49, 51, 55, 59, 61, 65, 67, 69, 73, 75, 87, 91, 93, 97, 103.
The Atom and Electron Configuration			
Jan. 27-31	Development of Atomic Structure. Protons, Electrons and Neutrons. Atomic Number and Atomic Mass. Isotopes. Atomic Weight. Mole. The Periodic Table	Chapter 2	Chapter 2: 17, 19, 21, 27, 29, 37, 39, 45, 47, 47, 51, 53, 55, 57, 59, 61, 63, 69, 73.
Feb. 3-7	Energy. The Nature of Light. Electromagnetic Radiation. The Electromagnetic Spectrum. Planck's Equation. Photoelectric Effect.	Chapter 3	Chapter 3: 5bc, 7c, 9, 15, 19, 25, 27, 29, 33, 35, 43, 45, 47, 49, 51, 57, 71, 73, 79, 81, 85, 93, 97, 101, 111, 115, 121, 133, 135b, 139, 149. .
Feb. 10-14	Atomic Line Spectra. Bohr's Model. The Wave Properties of Matter.		
Feb. 17-21	The Uncertainty Principle. The Quantum-Mechanical Model. Quantum Numbers. The Shapes of Atomic Orbitals		
Feb. 24-28	Electron Configurations. The Pauli Exclusion Principle. The Aufbau Principle. Hund's Rule. Atomic Subshell Energies and Electron Assignments		
Mar 3-7	Periodicity Periodic Trends of the Elements	Chapter 4	Chapter 4: 15, 19, 25, 39, 43, 45, 49, 53, 55, 59, 69de, 75, 77, 81, 83, 89, 91, 97, 111, 115, 125, 133.
Mar 3 -7	**EXAM 1**	**Ch. 1-4.**	
Periodic Trends of the Elements			
Ionic and Covalent Compounds			
Mar 10-14	Valence Electron. Lewis Electron-Dot Symbols. Ionic Compounds and Bonding. Formulas of Ionic Compounds. Bonding in Covalent Compounds. Naming Molecular Compounds. Molecular and Formula Masses	Chapter 5	Chapter 5: 7, 9, 17, 23, 25, 27,39, 41, 47, 49, 55, 57, 75, 79, 83, 85, 91
Representing Molecules			
Mar 24-28	Octet Rule. Lewis Structure. Exception of Octet Rule. Electronegativity. Dipole Moment. Polarity. Formal Charge. Resonance.	Chapter 6	Chapter 6: 9, 13, 17, 23abe, 25df, 29, 31, 39, 41, 53, 55, 67, 81a, 85

Molecular Geometry and Bonding Theories			
Mar 31-Apr 4 April 7-11	Molecular Geometry and Polarity. Valence Bond Theory	Chapter 7	Chapter 7: 7, 9, 11, 15, 19, 21, 35, 43, 45, 47, 71, 79, 85
April 7-11	**EXAM 2**	**Comprehensive**	
Chemical Reactions			
April 14-18	Balancing Chemical Equations. Mole Ratio. Limiting Reactant. Combustion Analysis: Empirical and Molecular Formula.	Chapter 8	Chapter 8: 5,7ce, 9,11,13,19,25,29,31 33,43,45,47,49,55
Chemical Reactions in Aqueous Solution			
April 21-25	Electrolytes and Nonelectrolytes. Precipitation Reactions. Acid-Base Reactions. Oxidation-Reduction Reactions. Concentration of Solutions. Solution Chemistry.	Chapter 9	Chapter 9: 9,11,13,17,21,23c,25,35,43, 45,49,55,61,63,65a,69,71,75, 105,115
Gases			
April 28-May 2	Properties of Gases. The Kinetic Molecular Theory of Gases. The Gas Laws. The Ideal Gas Equation.	Chapter 10	Chapter 10: 9,11,13,31,33,35,37,39,43,45,47, 49,51,53,55,57,59,61
May 5-9	**EXAM 3**	**Ch. 8-10**	
Intermolecular Forces			
May 5-9	States of Matter and Intermolecular Forces	Chapter 12	Chapter 12: 11,13,15,33,55,59,63,89,97, 113,117,129,135,143,147
05/16	**FINAL EXAM**	**Comprehensive**	**8.00 -9.50 AM**

Tentative Lab Schedule for CHEM 103: Spring 2009

Experiment	Week
Check-in, Safety, and Introductory Exercises	Jan. 21-24
Introductory Practical	Jan. 27-31
Gases : Atomic Microscope	Feb. 3-7
Gases : Vernier	Feb. 10-14
Periodic Trends	Feb. 17-21
Ionic Compounds #1	Feb. 24-28
Ionic Compounds #2	Mar 3-7
Ionic Compounds #3	Mar 10-14
SPRING BREAK, NO LABS	**Mar 17-21**
Stoichiometry # 1	Mar 24-28
Stoichiometry # 2	Mar 31-Apr 4
Stoichiometry # 3	April 7-11
Molecules: Spartan	April 14-18
Molecules: Liquid Properties	April 21-25
Makeup Lab as needed	April 28-May 2
Lab Practical Exam	May 5-9