

## General Chemistry

CHEMISTRY 113 A

FALL, 2006

Office Hours: M W F 9:00 - 10:00 AM  
(or by appointment)

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( please, not after 10 PM)

### LECTURE TEXT

T. L. Brown, H. E. LeMay, and B. E. Bursten, *Chemistry: The Central Science, 10<sup>th</sup> Ed.*, Prentice-Hall, Upper Saddle River, NJ, 2006.

### RECOMMENDED SUPPORT TEXTS (Optional)

R. Wilson, *Solutions to Exercises in Chemistry the Central Science, 10<sup>th</sup> Ed.*, Prentice Hall, Upper Saddle River, NJ, 2006. (This book contains the solutions to all of the problems in the lecture text.)

### COURSE DESCRIPTION

The material covered in this course will be that usually covered in an introductory chemistry course. Some prior familiarity with the basic material, from High School Chemistry, is assumed, although an in depth knowledge of the material is not expected. The course is organized in such a fashion that the text and lecture-discussion sessions supplement each other. Students are also encouraged to consult other introductory texts in the library and the Chemistry Periodical Room (HOSCI 221 ) for additional help in understanding the material. These texts, as well as a number of review and study guides, can also serve as a source for additional work in problem solving, for students having trouble in this area. **Additionally, the instructor is available for private or group help sessions at most times during the day.**

### COURSE EXPECTATIONS

Students completing this course will be expected to do but not limited to the following

- Do basic chemical nomenclature of simple inorganic salts and simple organic compounds. Both going from name to formula and formula to name.
- Solve basic stoichiometric problems involving weight, solutions and gases in any combinations.
- Write balance chemical equations for simple reactions. Also, net ionic equations for reactions in aqueous solution.
- Understand the atomic nature of matter. Including the components of the atom and the modern theories of their arrangement in the atom.
- Understand the properties of atoms and be able to explain these in terms of atomic interactions.
- Understand the basic heat transformations in chemical systems.

- Be able to draw Lewis structures for simple inorganic molecules given the chemical formula, predict the three dimensional geometry about an atom, and indicate the atomic hybridization about an atom.
- Understand the bulk properties of matter and the intermolecular reactions that lead to these properties.

### ATTENDANCE

A student is required to attend all regular class and laboratory meetings. If a class is missed, it is the responsibility of the student to obtain the given material on his own time. If an hourly exam is missed, for a **VALID REASON ACCOMPANIED BY A WRITTEN EXCUSE ONLY**, the student should arrange a make-up time with the instructor as soon as possible after the exam. If this is not done within a reasonable amount of time a grade of zero will be assigned for the exam. If a laboratory is missed, arrangements should be made to make up the laboratory within one week of the student's return to classes. Arrangements for laboratory make-up should be made with the laboratory coordinator Dr. David Langhus (HOSCI 225, Ext. 1434, email [langhus@cs.moravian.edu](mailto:langhus@cs.moravian.edu))

### COURSE GRADE

Hour Exams (4) .....	40%
Laboratory .....	20%
Problem Session Quizzes.....	15%
Homework.....	5%
Final Examination .....	20%

Your minimum letter grade will be determined as follows, where the % represents your final average calculated as described above.

A	93% and up	C	73 to 76%
A-	90 to 92%	C-	70 to 72%
B+	87 to 89%	D+	67 to 69%
B	83 to 86%	D	63 to 66%
B-	80 to 82%	D-	60 to 62%
C+	77 to 79%	F	Below 60%

### LECTURE-DISCUSSION CLASSES

The lecture-discussion periods, **M W F 8:00 to 8:50 AM**, are the time during which the new material will be introduced and discussed the material covered in the course. Attendance at all of these classes is required as absence generally results in a poorer than expected showing on the work in the course. Hence, **ATTENDANCE WILL BE TAKEN AT ALL CLASSES**. Students who consistently miss class are subject to possible lowering of their grade from the scale above.

## GRADED HOMEWORK

At the end of most class periods, the instructor will give a brief assignment based on that day's class. These assignments will be due at the next lecture-discussion period. These assignments will usually be collected on and the grade from these assignments will constitute the homework portion of the grade. **NOTE: TO GET CREDIT FOR A COLLECTED HOMEWORK ASSIGNMENT THE STUDENT MUST BE PRESENT AT THE CLASS DURING WHICH THE ASSIGNMENT WAS COLLECTED. NO LATE ASSIGNMENTS WILL BE ACCEPTED. ALL ASSIGNMENTS NOT TURNED IN WILL BE ASSIGNED A GRADE OF ZERO, UNLESS A WRITTEN EXCUSE FOR ABSENCE FROM THE CLASS IS PROVIDED.** The solutions to these graded homework assignments will be posted on the course documents section of the course's Blackboard page, usually shortly after the class in which they are due.

## NON- GRADED HOMEWORK

There are two types of non-graded homework assignments in this course. The first type is the end of the chapter problems listed on the last page of this syllabus. You should work these problems in order to get a better understanding of the material covered in this course. The answers to these problems are found in the solutions manual listed above. The second type is the supplementary problem sheets handed out by the instructor. The solutions to these problems will be posted on the Blackboard course page. These problems provide additional reinforcement of the material covered in the course. **It is advisable to attempt to work each problem yourself before looking at the solution. Simply trying to memorize how the problem is solved, generally does not lead to very good understanding of the material and thus lower test scores.**

## PROBLEM SESSIONS

The problem session portion of the grade will be based on a 10-20 minute quiz given at the end of each problem session period, except those on weeks directly preceding an hourly examination. The material to be covered by the quiz will be announced in lecture prior to the quiz. **NO MAKE UP QUIZZES WILL BE GIVEN** and any missed quizzes will be assigned the grade of zero. At the end of the semester, the score on the lowest quiz will be dropped before the problem session average is computed. The keys of the quizzes will be posted on the course Blackboard page.

The initial part of the problem session period will be used to answer questions about the collected homework problems and those that have arisen regarding either the class material or the other assigned problems.

## HELP SESSIONS

The instructor will be available for group help sessions at **4:00 PM on Wednesday in room HOSCI-215**. These help sessions will be used to review and drill on student raised questions with the exact format depending on the number of students present. Attendance at

these help sessions is completely optional. ADDITIONAL HELP SESSIONS either private or group can be arranged at any time during the semester by consulting the instructor.

## EXAMINATIONS

There will be four (4) one-hour examinations given during the lecture period of the course on the following **FRIDAYS: Sept. 22, Oct. 13, Nov. 10, and Dec. 1**. You should mark these dates on your calendar to aid in avoiding conflicts with examinations in other courses. The specific material to be covered on each exam will be announced by the instructor prior to the exam. Copies of the exams from the previous two years, and the answer keys to these exams will be posted on the Blackboard course page approximately 1 week before the exam. While these examinations will give you some indication of the type and nature of the questions asked, you need to study all of the material covered on the examination to get the best possible grade.

## FINAL EXAMINATION

A comprehensive final examination will be given according to the college final examination schedule.

## ACADEMIC HONESTY

The Instructor views collaboration between students is viewed by as a valid means of reviewing the material. However, since collected assignments are to evaluate the **student's mastery of the material**, there should be **NO EVIDENCE OF COLLABORATION ON HOMEWORK ASSIGNMENTS, QUIZZES, AND EXAMINATIONS**. If collaboration on a graded assignment is observed it will be viewed as a breach of academic honesty and will be penalized accordingly. Breaches in Academic Honesty will be treated according to the Academic Honesty policy in the College Handbook.

## DATES OF IMPORTANCE

Sept.	5	Last Day For Course Changes
Oct.	6	Midsemester
Oct.	9, 10	Fall Break
Nov.	10	Last Day to Withdraw
Nov.	21 - 26	Thanksgiving Break

## TENTATIVE LECTURE DISCUSSION SCHEDULE

Day	Date	Topic	Text. Ref.
Mon.	Aug. 28	Introduction	1.1
Wed.	Aug. 30	Measurement, Dimensional Analysis	1.4
Thurs.	Aug. 31	Density (in PS)	1.6
Fri.	Sept. 1	Elements, Compounds, Atomic Nature of Matter	1.2 – 1.3, 2.1
Mon.	Sept. 4	No Class - Labor day	
Wed.	Sept. 6	Atomic make-up, Periodic Table	2.2 – 2.5
Fri.	Sept. 8	Molecules, Ions, Ionic Compounds	2.6 – 2.7
Mon.	Sept. 11	Basic Nomenclature	2.7
Wed.	Sept. 13	Chemical Reactions, Molecular Masses	3.1 – 3.3
Fri.	Sept. 15	The Mole	3.4
Mon.	Sept. 18	Chemical Formulas	3.5
Wed.	Sept. 20	Reaction Stoichiometry	3.6 – 3.7
Fri.	Sept. 22	<b>Exam 1</b>	-----
Mon.	Sept. 25	Acids, Bases, Salts, Ions in Solution	4.1
Wed.	Sept. 27	Reactions in Aqueous Solution	4.2 - 4.3
Fri.	Sept. 29	Reactions in Aqueous Solution cont.	4.3
Mon.	Oct. 2	Oxidation Numbers, Activity Series	4.4
Wed.	Oct. 4	Molarity, Dilution,	4.5
Fri.	Oct. 6	Solution Stoichiometry	4.6
Mon.	Oct. 9	No Class – Fall Break	-----
Wed.	Oct. 11	Introduction to Thermochemistry	5.1 – 5.4
Fri.	Oct. 13	<b>Exam 2</b>	-----
Mon.	Oct. 16	Calorimetry	5.5
Wed.	Oct. 18	Enthalpies of Reaction	5.6 – 5.8
Fri.	Oct. 20	Quantization of Energy, Bohr's Theory	6.1 – 6.3
Mon.	Oct. 23	Wave Model of the Atom, Quantum Numbers	6.4 – 6.6
Wed.	Oct. 25	Orbitals, Electron Configurations	6.7 – 6.9
Fri.	Oct. 27	Periodic Properties	7.1 – 7.5
Mon.	Oct. 30	Periodic Chemical Reactivity	7.6 – 7.8
Wed.	Nov. 1	Ionic Bonding	8.1 – 8.2
Fri.	Nov. 3	Intro. to Covalent Bonding, Electronegativity	8.3 – 8.4

Day	Date	Topic	Text. Ref.
Mon.	Nov. 6	Bond Polarity, Lewis Structures	8.5
Wed.	Nov. 8	Resonance, Formal Charge, Bond Energy	8.6 – 8.8
Fri.	Nov. 10	<b>Exam 3</b>	-----
Mon.	Nov. 13	VSEPR	9.1 – 9.2
Wed.	Nov. 15	Molecular Polarity	9.3
Fri.	Nov. 17	Valence Bond Theory	9.4 – 9.6
Mon.	Nov. 20	Kinetic Molecular Theory, Basic Gas Laws	10.7, 10.1 – 10.3
Wed.	Nov. 22	No Class – Thanksgiving Vacation	-----
Fri.	Nov. 24	No Class – Thanksgiving Vacation	-----
Mon.	Nov. 27	Applications of Gas Laws	10.4 - 10.5
Wed.	Nov. 29	Gas Mixtures	10.6
Fri.	Dec. 1	<b>Exam 4</b>	-----
Mon.	Dec. 4	Diffusion, Deviations from Ideal behavior	10.8 – 10.9
Wed.	Dec. 6	Intermolecular Forces	11.1 – 11.2
Fri.	Dec. 8	Liquids, Phase Diagrams	11.3 – 11.6
Mon.	Dec. 11	Solids	11.7 – 11.8

### ASSIGNED PROBLEMS

While you should work ALL of the problems assigned below, the more important examples are indicated in **boldface type**. Some of the more difficult problems or those that may require additional thought are **boldfaced and underlined**. You definitely should work all of these problems. If you have trouble with these, the other problems will give you additional practice in understanding the material.

#### Chapter 1

1.9, 1.10, **1.11, 1.12**, , **1.13, 1.14, 1.15, 1.16**, 1.17, 1.18, 1.19, 1.20, 1.23, 1.24, 1.25, 1.26, **1.27, 1.28, 1.29, 1.30, 1.31**, 1.32, 1.43, 1.44, 1.45, **1.46, 1.47, 1.48, 1.49, 1.50, 1.51, 1.52, 1.53, 1.54, 1.56**, 1.58, **1.60**, 1.63, **1.65, 1.66, 1.67, 1.68, 1.69, 1.70, 1.71, 1.73, 1.74, 1.75, 1.76, 1.77, 1.78**  
 Visualizing Concepts: **1.1, 1.2, 1.3, 1.7, 1.8**

#### Chapter 2

2.7, **2.8, 2.13**, 2.17, 2.18, 2.19, 2.20, **2.21, 2.22, 2.213, 2.24, 2.25, 2.26, 2.35, 2.36, 2.37, 2.38, 2.39**, 2.41, 2.42, 2.43, 2.44, **2.45, 2.46, 2.47, 2.48, 2.49, 2.50, 2.51, 2.52, 2.53, 2.54, 2.55, 2.56, 2.57, 2.58, 2.59, 2.60, 2.61, 2.62, 2.63, 2.64, 2.65, 2.66, 2.67, 2.68, 7.70, 2.71, 2.72, 2.75, 2.82, 2.88, 2.89, 2.90, 2.91, 2.92, 2.93, 2.94, 2.95, 2.96, 2.97**

Visualizing Concepts: 2.1, 2.2, 2.3, 2.4, 2.5, 2.6

### Chapter 3

3.10, 3.11, 3.12, **3.13**, **3.14**, 3.15, **3.16**, **3.16**, **3.17**, **3.18**, 3.19, 3.20, 3.21, 3.22, **3.23**, **3.24**, 3.25, 3.26, 3.27, 3.28, **3.29**, **3.30**, 3.331, 3.32, 3.332, 3.34, 3.35, 3.36, **3.37**, **3.38**, **3.39**, **3.40**, 3.41, 3.42, **3.43**, **3.44**, **3.45**, **3.46**, 3.47, 3.48, **3.49**, **3.50**, 3.51, 3.52, 3.53, 3.54, 3.55, **3.56**, 3.57, 3.58, **3.59**, **3.60**, 3.61, 3.62, 3.64, 3.65, 3.66, 3.67, 3.68, 3.69, 3.70, **3.71**, **3.72**, 3.73, 3.74, 3.75, 3.76, 3.77, 3.78, 3.79, 3.80, **3.81**, **3.82**, **3.83**, 3.84, 3.85, 3.86, 3.87, 3.88, 3.89, 3.90, 3.91, 3.92, 3.93, 3.94, **3.95**, 3.96, 3.97, 3.99, **3.100**

Integrative Exercises: 3.101, 3.102, 3.106, 3.107

Visualizing Concepts: **3.1**, 3.2, 3.3, 3.4, **3.5**, 3.6, 3.7, 3.8

### Chapter 4

4.11, 4.12, 4.13, 4.14, 4.15, 4.16, 4.17, 4.18, 4.19, 4.20, 4.21, 4.22, 4.23, 4.24, 4.25, 4.26, 4.27, 4.28, 4.29, 4.30, 4.31, 4.32, 4.33, 4.34, 4.35, 4.36, 4.37, 4.38, 4.39, 4.40, 4.41, 4.42, 4.43, 4.44, 4.45, 4.47, 4.48, 4.49, 4.50, 4.51, 4.52, 4.52, 4.53, 4.54, 4.555, 4.56, 4.57, 4.58, 4.59, 4.60, 4.61, 4.62, 4.63, 4.64, 4.65, 4.66, 4.67, 4.68, 4.69, 4.70, 4.71, 4.72, 4.73, 4.74, 4.75, 4.76, 4.77, 4.78, 4.79, 4.80, 4.81, 4.82, 4.83, 4.84, 4.85, 4.86, 4.87, 4.88, 4.90, 4.91, 4.92, 4.93, 4.96, 4.97, 4.98, 4.99, 4.101, 4.102, 4.103, 4.104

Integrative Exercises: 4.105, 4.106, 4.107, 4.109, 4.110, 4.112, 4.113, 4.114,

Visualizing Concepts: 4.1, 4.2, 4.3, 4.4, 4.5, 4.7, 4.8, 4.9, 4.10

### Chapter 5

5.10, 5.17, 5.19, 5.20, **5.21**, **5.22**, 5.23, 5.24, 5.25, 5.26, 5.29, 5.30, 5.31, **5.33**, **5.34**, **5.35**, 5.36, 5.37, 5.38, 5.39, 5.40, **5.45**, **5.46**, 4.47, **5.48**, 5.49, 5.50, **5.51**, **5.52**, 5.53, 5.54, 5.55, 5.56, 5.57, 5.58, 5.59, 5.60, 5.61, 5.62, 5.63, 5.64, 5.65, **5.66**, 5.67, 5.68, **5.69**, 5.70, 5.71, 5.72, 5.73, 5.74, 5.75, 5.76, 5.77, 5.78, **5.83**, **5.85**, **5.86**, **5.89**, **5.95**, 5.97, 5.98, 5.99, 5.100, 5.101, 5.104

Integrative Exercises: 5.110, 5.111, 5.112, 5.113, 5.114

Visualizing Concepts: 5.2, 5.3, 5.4, 5.5, 5.7, 5.8

### Chapter 6

6.10, 6.11, 6.12, **6.13**, **6.19**, 6.20, 6.31, **6.32**, 6.33, 6.34, 6.48, 6.49, 6.50, 6.51, **6.52**, 6.53, 6.54, 6.55, 6.56, 6.57, 6.59, **6.60**, 6.61, 6.62, 6.63, **6.64**, 6.65, **6.66**, **6.67**, **6.68**, 6.69, 6.70, **6.71**, **6.72**, 6.73, 6.74, 6.85, 6.89, 6.90, 6.92, 6.96, **9.97**, 6.98

Integrative Exercises: 6.101, 6.102, 6.104

Visualizing Concepts: 6.2, 6.3, 6.4, 6.5, 6.7, 6.8

### Chapter 7

7.9, 7.10, 7.11, 7.12, 7.13, 7.14, 7.17, 7.18, 7.19, 7.20, **7.21**, **7.22**, 7.23, 7.24, 7.25, 7.26, 7.27, 7.28, 7.29, 7.30, 7.31, 7.32, 7.33, 7.34, 7.35, 7.36, **7.37**, **7.38**, 7.39, 7.40, **7.41**, 7.42, 7.43, 7.44, 7.45, 7.46, 7.47, 7.48, **7.49**, **7.50**, **7.51**, 7.52, 7.54, 7.55, 7.56, 7.57, 7.58, 7.59, **7.60**, 7.61, 7.62,

7.63, 7.64, 7.65, 7.67, 7.68, 7.69, 7.70, 7.72, 7.73, 7.74, 7.77, 7.78, 7.81, 7.82, 7.83, 7.84,  
7.86, 7.87, 7.90, 7.91, 7.93, 7.94, 7.95, 7.97, 7.99, 7.100, 7.101

Integrative Exercises: 7.108, 7.109, 7.110

Visualizing Concepts: 7.1, 7.4, 7.5, 7.6

## Chapter 8

8.7, 8.8, 8.9, 8.10, 8.11, 8.12, 8.13, 8.14, 8.15, 8.16, 8.17, 8.18, 8.19, 8.20, 8.21, 8.22, 8.23, 8.24,  
8.29, 8.30, 8.31, 8.32, 8.33, 8.34, 8.35, 8.36, 8.37, 8.38, 8.39, 8.40, 8.43, 8.44, 8.45, 8.46, 8.47,  
8.48, 8.49, 8.50, 8.51, 8.52, 8.53, 8.54, 8.55, 8.56, 8.58, 8.60, 8.61, 8.62, 8.63, 8.64, 8.74, 8.78,  
8.79, 8.80, 8.81, 8.83, 8.84, 8.85, 8.86

Integrative Exercises: 8.94, 8.97, 8.99, 8.100

Visualizing Concepts: 8.1, 8.2, 8.3, 8.4, 8.5, 8.6

## Chapter 9

9.11, 9.12, 9.13, 9.14, 9.15, 9.16, 9.17, 9.18, 9.19, 9.20, 9.21, 9.22, 9.23, 9.24, 9.25, 9.26, 9.27,  
9.28, 9.29, 9.30, 9.31, 9.32, 9.33, 9.34, 9.35, 9.36, 9.37, 9.38, 9.39, 9.40, 9.42, 9.43, 9.44, 9.47,  
9.48, 9.49, 9.50, 9.51, 9.52, 9.53, 9.54, 9.55, 9.56, 9.57, 9.58, 9.75, 9.76, 9.78, 9.79, 9.80, 9.81,  
9.82, 9.84, 9.86, 9.87, 9.88, 9.93

Integrative Exercises: 9.96, 9.98,

Visualizing Concepts: 9.1, 9.2, 9.3, 9.4, 9.6, 9.7, 9.8

## Chapter 10

10.9, 10.10, 10.13, 10.14, 10.16, 10.19, 10.21, 10.22, 10.23, 10.24, 10.25, 10.26, 10.27, 10.28,  
10.29, 10.30, 10.31, 10.32, 10.33, 10.34, 10.35, 10.36, 10.37, 10.38, 10.39, 10.41, 10.42, 10.43,  
10.44, 10.45, 10.46, 10.47, 10.48, 10.49, 10.50, 10.51, 10.52, 10.53, 10.54, 10.56, 10.57, 10.58,  
10.59, 10.60, 10.61, 10.62, 10.63, 10.64, 10.65, 10.66, 10.67, 10.68, 10.69, 10.70, 10.73, 10.74,  
10.77, 10.79, 10.80, 10.81, 10.82, 10.84, 10.89, 10.90, 10.91, 10.92, 10.93, 10.95, 10.96, 10.97,  
10.98, 10.99, 10.102

Integrative Exercises: 10.105, 10.106, 10.108, 10.110, 10.112

Visualizing Concepts: 10.1, 10.2, 10.3, 10.4, 10.5, 10.7, 10.8

## Chapter 11

11.9, 11.10, 11.11, 11.12, 11.13, 11.14, 11.15, 11.16, 11.17, 11.18, 11.19, 11.20, 11.21, 11.22,  
11.23, 11.24, 11.25, 11.26, 11.27, 11.29, 11.30, 11.31, 11.32, 11.33, 11.34, 11.36, 11.41, 11.42,  
11.43, 11.44, 11.45, 11.46, 11.47, 11.48, 11.49, 11.51, 11.52, 11.53, 11.54, 11.57, 11.58, 11.59,  
11.60, 11.65, 11.66, 11.71, 11.72, 11.73, 11.74, 11.77, 11.78, 11.79, 11.80, 11.81, 11.82, 11.83,  
11.85, 11.88, 11.92

Integrative Exercises: 11.99, 11.100, 11.101, 11.102

Visualizing Concepts: 11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7, 11.8