WIDENER UNIVERSITY
SCIENCE DIVISION – CHEMISTRY

Spring 2007– Chem 105-C, D Dr. Andrea E. Martin
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GENERAL, ORGANIC AND BIOCHEMISTRY – SYLLABUS – SPRING 2007

Text: *Essentials of General, Organic, & Biological Chemistry*, by Melvin Armold, Harcourt College Publishers, 2001.

Prerequisite (from the University Undergraduate Bulletin): Math 101

Lecture: Monday, Wednesday, and Friday, 1:00-1:50 pm, in Kirkbride 149.

Workshop: this portion of the lecture will be used for YOU to work problems and participate in group assignments. Workshops give you the opportunity to ask any questions you have regarding lecture or lab material, homework problems, etc. *BE PREPARED TO PARTICIPATE!* **Section C – Tuesday, 9:30 -10:45 am (KB332); Section D – Tuesday, 11:00 am – 12:15 pm (KB 432). Workshop attendance is required**. You will receive +1/2 point for every workshop attended and –1/2 point for every one missed.

Course Content: Attached is a tentative schedule of topics that will be covered. Alterations may be made as necessary. Announcements of changes will be made in class. You are responsible for knowing everything which transpires in class, even if you are absent. I cannot be responsible for finding you to let you know what you have missed if you are absent.

If you hope to do well in this class, it is essential that you read and think about the chapter material BEFORE coming to class. You MUST also read the Appendix and Introduction to the text. Appendix I contains material on Scientific Notation and calculations that you are expected to know. There is also a Glossary. Look up definitions here! You will find this very useful.

Office Hours: are listed above. The only dumb question is the one that goes unanswered. When you have a question or problem, try to focus specifically on what it is that you do not understand. The better you can identify the source of your confusion, the faster we can begin to solve the problem. I do my best to be helpful – PLEASE come to me at once if you have questions or problems. Please note: NO OFFICE HOURS ON THURSDAYS! Since Thursday is exam day, so you must prepare your questions and see me ahead of time!

HOMEWORK: CHEMISTRY TAKES PRACTICE!!! Working problems is an excellent method for studying and learning the material. Homework is assigned to help you apply what you are learning and to help you practice the type of questions that will appear on your exams. While I will not collect and grade homework, it will be discussed in the Workshop section of the course and you may be called upon to show how you worked the problem. The problems will be assigned weekly, and are the MINIMUM you are expected to do. All other questions in the chapters are fair game, and it is in your best interest to work as many as possible. HOMEWORK ASSIGNMENTS WILL BE POSTED AT LEAST WEEKLY ON CAMPUS CRUISER.

EXAMS: Exam periods are Thursdays from 4:00 to 5:30 pm. Exams will be given during the exam period on the following dates. The material covered on each exam will be discussed during the class session prior to the exam. Exams are scheduled for:

February 1
February 22
March 22
April 12
April 26

FINAL EXAM: Will cover the **entire semester** and will be scheduled by the University.

IF YOU ARE ABSENT FROM AN EXAM IT WILL COUNT AS A ZERO. There are no make-up exams given. Reconsideration of this policy may be possible under extenuating circumstances (ones beyond your control). I will be the sole judge as to whether or not sufficient extenuating circumstances exist. If you miss an exam and feel extenuating circumstances exist, you must contact me within 24 hours after the missed exam. If you do not, there will be no reconsideration under any circumstances. In addition, once an exam has been graded and returned to the class, no make-ups will be possible.

ATTENDANCE: Attendance records *will* be kept for all class meetings and workshops. As per the student handbook, if you miss more than twice the number of weekly class meetings, in this case, 8 total classes/workshops, you cannot pass the course, no matter how high your average.

GRADING: The course will be graded on the +/- system. The grading will be weighted as follows:

Hour exams	75%
Test corrections and self-assessments	10%
Comprehensive final exam	15%

Your attendance and participation in class will be a factor in determining borderline grades.

ACADEMIC FRAUD: The Science Division and the Chemistry Department strictly enforce the University's policy on cheating and other forms of academic fraud. Cheating on an exam will result in automatic failure of the course. See the student handbook for details. Cheating includes, but is not limited to, any of the following: **giving or receiving** information about an exam at any time, copying from somebody else's paper during an exam, using someone else's work for an assignment, using unapproved material for an exam, or removing exam material from an instructor's office.

STUDYING: Expect to spend a **minimum of 10-12 hours per week** studying for THIS course outside of class time and in addition to any other classes you are taking. (Looking at it another way, 1-2 hours EVERY day.) Use your text and class notes as a starting point for studying, along with homework questions. If you do not find these to be effective, see me as soon as possible. **Free tutoring will be available – take advantage of it!** In addition, the University has resources that may help in related areas (mathematics, reading comprehension). **DO NOT WAIT to seek help** if you are finding the material difficult. Since later exams will build on materials learned early in class, you MUST stay abreast of the material. Do not expect to be able to learn this material simply by attending class. Do not expect to catch up if you do poorly early on.

No extra credit work will be given in this course.

INSTRUCTIONAL METHODS: Chemistry relies on application of knowledge more than just memorization of facts. My goal is to start you on the path to becoming an independent learner and to help you develop the problem-solving and critical-thinking skills that you will need in this and future courses. The methodology I will use is a mix of traditional lecture and process oriented guided inquiry learning (POGIL).

What is process oriented guided inquiry learning (POGIL)?

POGIL is a classroom and laboratory technique that seeks to simultaneously teach content and key process skills such as the ability to think analytically and work effectively as part of a collaborative team.

A POGIL classroom or lab consists of any number of students working in small groups on specially designed guided inquiry materials. These materials supply students with data or information followed by leading questions designed to guide them toward formulation of their own valid conclusions - essentially a recapitulation of the scientific method. The instructor serves as facilitator, observing and periodically addressing individual and classroom-wide needs.

POGIL is based on research indicating that a) teaching by telling does not work for most students, b) students who are part of an interactive community are more likely to be successful, and c) knowledge is personal; students enjoy themselves more and develop greater ownership over the material when they are given an opportunity to construct their own understanding.

http://www.pogil.org/info/introduction.php

You will be given a handout that explains POGIL and its application in this class during the first class period.

EXPECTATIONS
You are expected to:

1. Arrive on time for class and remain in class until the end of the period. It is disruptive to the class when students wander in late or leave early.
2. Come to class prepared by having read the material to be covered in class.
3. Listen attentively during lecture.
4. Ask questions.
5. Be quiet when others have the floor. If you cannot sit in class without engaging in side conversations with your classmates, then you do not belong in class and I will have to ask you to leave. I hope you will be able to stay!
6. Act with integrity and honesty at all times.
7. Participate fully in group work.
8. Do your best!

MATH SKILLS –
A basic knowledge of algebra is necessary for this course. You will be given a math quiz at the beginning of the semester to help you determine if your math is ready for chemistry. This will not count as part of your chemistry grade.

LEARNING GOALS

1. Principles and Tools of Science
   1.1. The student recognizes the standard measurement units for length, mass, and volume (Chapter 1.2)
   1.2. The student can use metric units (Chapter 1.3)
   1.3. The student can convert from fractions to decimals and vice versa
   1.4. The student can use dimensional analysis (factor-label method) for conversions between unit systems and be able to apply this to calculation of drug dosages (Chapter 1.4-1.5)
   1.5. The student will understand different temperature scales and be able to convert between them (Chapter 1.7)
   1.6. The student can use scientific notation (Appendix)
   1.7. The student can define and calculate density and specific gravity (Chapter 1.6)
   1.8. The student will recognize the importance of making and recording accurate measurements in the healthcare professions

2. The Atom
   2.1. The student can distinguish between atoms and molecules (Chapter 2.1)
   2.2. The student can identify subatomic particles and determine their numbers in elements (Chapter 2.1)
   2.3. The student can explain the differences and similarities between isotopes of the same element (Chapter 2.2)
   2.4. The student can identify the chemicals and symbols for elements 1-18 as well as the trace elements important in biochemistry (Chapter 2.3-2.4)
   2.5. The student can identify and distinguish between families and periods (Chapters 2.3-2.4)
   2.6. The student can determine electron configurations of elements (Chapter 2.5)
   2.7. The student will understand the various types of decay processes and the types of particles emitted (Chapter 2.6)
   2.8. The student can relate nuclear chemistry to its uses in medicine (Chapter 2.6)

3. Chemical Bonding
   3.1. The student can use the octet rule and Lewis structures to represent molecules (Chapter 3.1)
   3.2. The student can predict the charge of ions (Chapter 3.2)
   3.3. The student can predict composition of ionic compounds based on valences (Chapter 3.3)
   3.4. The student can identify ionic and covalent compounds and predict which will form from given elements (Chapter 3.5)
   3.5. The student can recognize and predict shapes of molecules (Chapter 3.6)
   3.6. The student can determine polarity of a molecule from shape (Chapter 3.7)

4. The Language of Chemistry
   4.1. The student can determine the composition of a compound from its formula (Chapter 4.1)
   4.2. The student can name ionic compounds (Chapter 4.2)
   4.3. The student can name binary covalent compounds (Chapter 4.3)
   4.4. The student can write and interpret simple chemical equations (Chapter 4.4)
   4.5. The student can define the mole and carry out stoichiometry calculations (Chapter 4.5)

5. Gases, Liquids and Solids
   5.1. The student can identify changes in states of matter (Chapter 5.1)
   5.2. The student recognizes the relationship between energy gain/loss and changes in temperature (Chapter 5.2)
   5.3. The student will understand the concept of partial pressures and how they relate to medical topics such as anesthesia (Chapter 5.3 and 5.4)
   5.4. The student can define intermolecular forces and explain how they differ among gases, liquids and solids (Chapter 5.5)
   5.5. The student can identify hydrogen bonding (Chapter 5.5)

6. Solutions, Dispersions, and Suspensions
   6.1. The student can define solutions and solubility (Chapter 6.1)
   6.2. The student can express solution concentrations in units of molarity, weight percent and volume percent (Chapter 6.2)
   6.3. The student will understand colligative properties and be able to express a concentration in units of molality (Chapter 6.4)
   6.4. The student can identify hypertonic, isotonic, and hypotonic solutions and predict their effect on blood cells (Chapter 6.4)
   6.5. The student can relate electrolyte concentrations in blood to health (Chapter 6.4)

7. Chemical Reactions
   7.1. The student can recognize and identify acids, bases, and salts (Chapter 7.1)
   7.2. The student will understand the pH scale and be able to interconvert $[H^+]$ and $[OH^-]$ concentration and pH (Chapter 7.2 and 7.3)
   7.3. The student can define a buffer system and understand how a buffer system works (Chapter 7.4)

8. Organic Chemistry
   8.1. The student can distinguish between organic and inorganic compounds (Chapter 8.1)
   8.2. The student will recognize and be able to interpret the various types of chemical formulas (Chapter 8.2)
   8.3. The student can identify the key functional groups (Chapter 8.7 and inside back cover)
   8.4. The student can name basic organic compounds and draw structures from a name (Chapter 8.2 and related sections of the functional groups chapters)

8.5. The student can compare and contrast properties of organic compounds (portions of Chapters 8-11)
8.6. The student can identify polar and nonpolar molecules and relate polarity to solubility (portions of Chapters 8-11)
8.7. The student will recognize hydrogen bonding and be able to explain its effect on solubility and boiling point (Chapters 8-11)
8.8. The student can predict the products for basic organic reactions involving common functional groups (Chapters 8-11)
8.9. The student can identify and classify structural isomers (Chapter 8.5)
8.10. The student can identify and classify stereoisomers (Chapter 8.5)

9. Biochemistry
   9.1. Carbohydrates
      9.1.1. The student can define and classify simple carbohydrates (Chapter 12.1)
      9.1.2. The student can analyze and interpret Fischer and Haworth projections (Chapter 12.2 and 12.3)
      9.1.3. The student can distinguish between monosaccharides, disaccharides, and polysaccharides (Chapter 12.2, 12.4, 12.5)
      9.1.4. The student can differentiate between alpha- and beta-glycosidic bonds and relate that knowledge to starch and cellulose digestion (Chapter 12.5)
      9.1.5. The student can relate carbohydrate structure and function to biological roles (Chapter 12.5)
   9.2. Lipids
      9.2.1. The student can define lipids based on their solubility properties (Chapter 13.1)
      9.2.2. The student can identify the various types of lipids (Chapter 13.1-13.4)
      9.2.3. The student can relate lipid structure and function in the body (Chapter 13.1-13.4)
      9.2.4. The student can relate lipid properties to cell membranes (Chapter 13.5)
   9.3. Amino Acids and Proteins
      9.3.1. The student can recognize and name the naturally occurring amino acids (Chapter 14.1)
      9.3.2. The student will understand how amino acids link through peptide bonds to form proteins (Chapter 14.2)
      9.3.3. The student will understand the 4 levels of protein structure (Chapter 14.3)
      9.3.4. The student can identify the functions of proteins in the body (Chapter 14.4)
      9.3.5. The student will understand the importance of enzyme function in body chemistry (Chapter 15, introduction)

Chem 105 – Tentative Schedule (subject to change) – Spring, 2007
Dr. Andrea Martin

DATES*	CHAPTER
January 17, 19	Chapter 1 Math and Measurement
January 22, 24, 26,	Chapter 2 The Atom
January 29, 31	Chapter 3 Chemical Bonding
Exam 1 – February 1 – covers Chapters 1-3 (part)	
February 2, 5, 7	Chapter 3 (remainder) and Chapter 4 Language of Chemistry
February 9, 12	Chapter 5 Gases, Liquids & Solids
February 14, 16	Chapter 6 Solutions, Dispersions, Suspensions
February 19, 21	Chapter 7 Chemical Reactions
Exam 2, February 22 – covers Chapters 3-7 (part)	
February 23, 26	Chapter 7 continued
February 28, March 2	Chapter 8 Organic Chemistry – alkanes, formulas, nomenclature, isomers
March 5-9	SPRING BREAK
March 12, 14, 16	Chapters 8-11 Organic Chemistry – alkenes, functional groups, reactions
March 19, 21	Chapters 8-11 Organic Chemistry – polarity, properties
Exam 3, March 22 – covers Chapters 7-11	
March 23, 26, 28	Chapters 11-16 Organic Chemistry – miscellaneous topics
March 30, April 2, 4	Chapter 12 Carbohydrates
April 6	no class - Holiday
April 9, 11	Chapter 13 Lipids
Exam 4, April 12 – covers Chapter 12 and balance of Organic Chemistry	
April 13, 16, 18, 23	Chapter 14 – NO CLASS 4/20 – SENIOR PROJECTS DAY Proteins
April 25, 27, 30	Chapter 15 Enzymes
Exam 5, April 26 – covers Chapters 13-14	
May 2	Review

*Workshop periods are not listed here. They will be used for group work and problem solving related to the current lecture material. They will also be an opportunity for homework and test review.

FINAL EXAM – during finals week, to be announced - Comprehensive