Chemistry 251 (Organic Chemistry Lecture I) ***SYLLABUS*** Fall 2008 *(rev 09.02.08)*

**Prof. Marietta Schwartz**
**Office: S-1-082**
**Telephone: 617.287.6146**
**E-mail: marietta.schwartz@umb.edu**

**Course Web Page: http://www.chem.umb.edu/chemistry/orgchem/**

***This course satisfies the Natural Sciences Distribution Requirement. It offers the opportunity to continue exploring the laws of the physical and biological world, how they are derived and tested through observation, theory, and experiment, and provides an understanding of the "correctable" nature of scientific knowledge and the interconnections among science, technology, and social concerns. In-class instruction and practice is provided in Quantitative Reasoning and the Use of Technology to Further Learning.***

**PLEASE NOTE: YOU MUST ALSO BE ENROLLED IN CH 255, ORGANIC LABORATORY I!!**

## *Basic Course Information*

**Lecture:** M W F 11:00 AM — 12:00 Noon (Science Building, Lipke Auditorium)
**Discussion:** M (1:00 PM), T (2:00 PM), W (1:00 PM), Th (2:00 PM), F (1:00 PM) – all in S-2-062.

**Required Materials:** "Organic Chemistry", Solomons & Fryhle, 9th edition (a solution manual/study guide is also available)

An iClicker is required. These can be purchased *only* at the UMB bookstore. This looks like a small TV remote control. You transmit your answer to the receiver in Lipke and your answer is logged by the computer. (Same as the one used in Biology courses; if you already have one of those, it will work in this class also.)

**Course Content:** Chapters 1-10.

**Exams:** There will be four (4) in-class exams and a final, to be given on the dates listed below.
Wednesday, October 1
Friday, October 31
Friday, November 21
Friday, December 12
(Final exam as scheduled by the Registrar's Office the week of December 15-19.)

## *Supplementary Materials*

"Pushing Electrons, A Guide for Students of Organic Chemistry", D.P. Weeks, 3rd edition, and "Organic Chemistry as a Second Language", David Klein (note: the first edition was one book; the second edition has been split into two books, one for each semester. Either version is fine; this resource is highly recommended. In fact, it should come

bundled with the textbook.) "ChemOffice" software is available on the computer labs in the library (you don't need to purchase it).

## *General Information*

This course consists of **lecture and discussion**. As of Fall 2008, the organic laboratory is a separate course (CH 255 and CH 256, Organic Laboratory I/II). There will be no lab credit allowed for students who took the lab in the previous version of the course (CH 253); CH 251 and CH 255 are co-requisites, and students must be enrolled in and attending both courses.

**There are NO MAKE-UP EXAMS.** The lowest score from the first three in-class exams will be dropped.

**Incompletes** for this course are only allowed under exceptional circumstances, and are never granted automatically. This means that if you think you qualify for an incomplete, you must request one! The basic requirements for an INC are: (1) you must be passing the course, and (2) you must have an insurmountable reason for not being able to finish the course. INCs are never given before the withdrawal deadline has passed.

**Accommodations:** Section 504 of the Americans with Disabilities Act of 1990 offers guidelines for curriculum modifications and adaptations for students with documented disabilities. If applicable, students may obtain adaptation recommendations from the Ross Center for Disability Services, M-1-401, (617-287-7430). The student must present these recommendations and discuss them with each professor within a reasonable period, preferably by the end of the Drop/Add period.

**Student Conduct**: Students are required to adhere to the University Policy on Academic Standards and Cheating, to the University Statement on Plagiarism and the Documentation of Written Work, and to the Code of Student Conduct as delineated in the University Catalog and Student Handbook. The Code is available online at: http://www.umb.edu/student_services/student_rights/code_conduct.html.

## *Extra Credit*

**OWL.** You may add up to 30 points (3%) to your total score by working on the OWL (Online Web-based Learning) system. This is an online homework system that allows multiple tries at questions, with the questions changing randomly. The system can be accessed at http://owl.oit.umass.edu and more information (and a link to the site) is available on the course website. Please be sure to check the due dates for the various sections. Note that the assignment numbers on OWL do NOT correlate with the chapter numbers in the textbook. Look at the topics instead of the numbers.

**iClickers.** You are required to purchase an iClicker remote for in-class participation. iClicker is a response system that allows you to respond to questions I pose during class, and you can add up to 20 points (2%) to your total score by participating. In order to receive this credit, you will need to register your iClicker remote online within the first week of class. You must have come to class at least once and voted on at least one question in order to complete this registration properly. Once you have voted on a question in my class, go to http://www.iclicker.com/registration. Complete the fields with your first name, last name, student ID, and remote ID. Your student ID should be the eight digits of your UMS number. The remote ID is the series of numbers and sometimes letters found on the bottom of the back of your iClicker remote. iClicker will be used most days in class, and you are responsible for bringing your remote daily.

**Discussion/POGIL.** This year, we will be doing regular activities in discussion, called POGIL (process-oriented guided inquiry learning; http://www.pogil.org for more information). You can add up to 20 points (2%) to your total score by participating. There is a workbook for this; it will be available in the bookstore (along with a student solution manual). The first few activities are posted on a website since the publisher ran out of books! Go to http://www.pogil.org/workbook2e/ for the materials.

## *Homework Assignments*

A list of selected problems from the end of each chapter is available on the course web page. These problems should be done at a minimum. You are encouraged to do as many of the problems, both within the chapter and at the end of the chapter, as possible. Organic chemistry is learned by doing, not by reading; therefore it is to your advantage to do as many problems as possible. See the course web page for links to online sources of problems as well.

## *Miscellaneous Information*

- A useful piece of equipment for the course is a molecular modeling kit (available at the bookstore). Many aspects of organic chemistry are easier to understand when models are used as a study aid. Both models and calculators may be used during exams if desired.
- Tutors are available through Academic Support Services (Campus Center, 1st Floor)

## *Learning Organic Chemistry*

Learning organic chemistry is not easy; it requires you to commit both time and intellectual effort. Learning anything requires reinforcement through repetition, especially in different contexts.

**Lectures**: learn with your ears
rank importance of topics (chapter summaries help)

**Notes**: focus your attention on the subject
should be rewritten after class - learn by writing

**Textbook**: not just for reading, but read with concentration and thought

**Homework**:[1] very important! helpful for you - do you KNOW the material?
work in groups - if you can explain it, you probably know it
do NOT use the answer book until after you attempt the problems!

**Laboratory**: experimental techniques of organic chemistry
reinforcement to learning the lecture material
NOT two different subjects! try to relate to lecture at all times

1. *Some problems are routine drill, while others are more challenging and require you to sort out the concepts and patterns relevant to the problem and then apply them in a logical way to the development of an answer. You will learn organic chemistry best by doing the problems!*

# General Introduction
# or
# WHOSE "BRILLIANT" IDEA WAS IT FOR ME TO TAKE ORGANIC CHEMISTRY, ANYWAY?[2]

Good question. What is the problem with organic chemistry that causes so many students to view the class with so much anxiety? I think there are at least two good reasons:

1. Very bad experiences in freshman chemistry. Even students interested in chemistry find significant stretches of "Chem I" to be intolerably dull.

2. Comments from students who've just finished taking organic chemistry. For example: "you have to memorize eight hundred million reactions, and then they don't even ask you the ones you've had in class on the tests."

Let's take these one at a time. Freshman chemistry is a little like scrambled eggs with a lot of other ingredients mixed in: a little bit of theoretical chemistry (electronic structure, bonding), physical chemistry (gas laws, equilibria, kinetics), inorganic chemistry (periodic table, descriptive chemistry of the elements, coordination compounds), organic chemistry (hydrocarbons, other types of carbon compounds), and who knows what else. No wonder so many students finish the first year of chemistry without the slightest trace of an overview of what they've sat through, or the faintest hint of an idea of what's supposed to come next. The problem is that "chemistry" is a very big operation that covers a lot of territory. It starts with atoms, but can go in lots of directions, and each of these can get pretty complicated. For now, all you need to know is that only a portion of what you saw in freshman chemistry is necessary as background for organic chemistry. This will be the subject of the first chapter of your textbook.

As for the second reason people are afraid of organic chemistry, all that famous "memorizing" you have to do, like most stories heard over and over again, there is truth to it. You will have to memorize a lot of organic chemistry. However, you won't have to memorize eight hundred million reactions. If you try to do that, you will be lucky to pass the course *even if you succeed*. What you really have to memorize are some basic properties of atoms and molecules, a number of principles that describe why and how reactions take place, and a number of reaction types that later can be generalized to include the various reactions of organic compounds that you will see throughout the course. From this framework you will be shown how the various details of organic chemistry are derived from some basic principles or "ground rules". You'll be expected to learn about, and *really understand* these ground rules, so that you can apply them in a logical way to completely new kinds of situations, and come up with sensible answers. It's a little like learning arithmetic. You all learned how to add when you were little. So, if someone asked you to add -1845 2/3 to 793 1/5, you would be able to figure out how to do it, even though it's pretty unlikely that you've added -1845 2/3 to 793 1/5 ever before in your life. This is because you are familiar with some basic ground rules: what + and - signs mean, how to do fractions, the general methodology for adding (carrying numbers and all that). The difference is that you do arithmetic in elementary school and organic chemistry in college. The principles, the ground rules, and the methods of organic chemistry are going to go by quickly, and you're going to have to learn them well enough to make use of them... quickly.

---

*2. N.E. Schore, "Study Guide and Solutions Manual for Organic Chemistry", W.H. Freeman and Co., New York, NY, 1987*

## *LECTURE SCHEDULE (APPROXIMATE)*

| Day | Date | Topic | Chapter Number |
|---|---|---|---|
| **Monday** | 1 Sept | **No Classes – Labor Day** | - |
| **Wednesday** | 3 Sept | Announcements, etc. | - |
| **Friday** | 5 Sept | Bonding & Molecular Structure | 1 |
| **Monday** | 8 Sept | Bonding & Molecular Structure | 1 |
| **Wednesday** | 10 Sept | Bonding & Molecular Structure | 1 |
| **Friday** | 12 Sept | Bonding & Molecular Structure | 1 |
| **Monday** | 15 Sept | Functional Group, Intermolecular Forces, IR Spectroscopy | 2 |
| **Wednesday** | 17 Sept | Functional Group, Intermolecular Forces, IR Spectroscopy | 2 |
| **Friday** | 19 Sept | Functional Group, Intermolecular Forces, IR Spectroscopy | 2 |
| **Monday** | 22 Sept | Acids & Bases | 3 |
| **Wednesday** | 24 Sept | Acids & Bases | 3 |
| **Friday** | 26 Sept | Acids & Bases | 3 |
| **Monday** | 29 Sept | Acids & Bases | 3 |
| **Wednesday** | 1 Oct | ***Exam #1*** | - |
| **Friday** | 3 Oct | Alkane Nomenclature & Conformational Analysis | 4 |
| **Monday** | 6 Oct | Alkane Nomenclature & Conformational Analysis | 4 |
| **Wednesday** | 8 Oct | Alkane Nomenclature & Conformational Analysis | 4 |
| **Friday** | 10 Oct | Alkane Nomenclature & Conformational Analysis | 4 |
| **Monday** | 13 Oct | **No Classes – Columbus Day** | - |
| **Wednesday** | 15 Oct | Alkane Nomenclature & Conformational Analysis | 4 |
| **Friday** | 17 Oct | Alkane Nomenclature & Conformational Analysis | 4 |
| **Monday** | 20 Oct | Stereochemistry | 5 |
| **Wednesday** | 22 Oct | Stereochemistry | 5 |
| **Friday** | 24 Oct | Stereochemistry | 5 |
| **Monday** | 27 Oct | Ionic Reactions | 6 |
| **Wednesday** | 29 Oct | Ionic Reactions | 6 |
| **Friday** | 31 Oct | ***Exam #2*** | - |
| **Monday** | 3 Nov | Ionic Reactions | 6 |
| **Wednesday** | 5 Nov | Ionic Reactions | 6 |
| **Friday** | 7 Nov | Alkenes/Alkynes I | 7 |
| **Monday** | 10 Nov | Alkenes/Alkynes I | 7 |
| **Wednesday** | 12 Nov | Alkenes/Alkynes I | 7 |
| **Friday** | 14 Nov | Alkenes/Alkynes II | 8 |
| **Monday** | 17 Nov | Alkenes/Alkynes II | 8 |
| **Wednesday** | 19 Nov | Alkenes/Alkynes II | 8 |
| **Friday** | 21 Nov | ***Exam #3*** | - |
| **Monday** | 24 Nov | NMR & Mass Spec | 9 |
| **Wednesday** | 26 Nov | NMR & Mass Spec | 9 |
| **Friday** | 28 Nov | **No Classes – Thanksgiving Recess** | - |
| **Monday** | 1 Dec | NMR & Mass Spec | 9 |
| **Wednesday** | 3 Dec | NMR & Mass Spec | 9 |
| **Friday** | 5 Dec | Radical Reactions | 10 |
| **Monday** | 8 Dec | Radical Reactions | 10 |
| **Wednesday** | 10 Dec | Radical Reactions | 10 |
| **Friday** | 12 Dec | ***Exam #4*** | - |