CHEM 3104 **Organic Chemistry I** **Syllabus** **Fall 2009**

Instructor Dr. Nathan J. Malmberg

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Textbook Organic Chemistry, Fifth Edition by Paula Y. Bruice ISBN: 0-13-196316-3

Lab Text Microscale Organic Laboratory, Fourth Edition by Dana W. Mayo, Ronald M. Pike and Peter K. Trumper ISBN: 0-471-32185-0

Also Recommended A molecular model kit to practice nomenclature and stereochemistry, such as The Prentice Hall Molecular Model Set For Organic Chemistry.

Course Meets MWF at 8:00-8:50 AM in Wood 102

Lab Meets Tuesday or Thursday at 1:00-5:00 PM in Wood 209

Description Considers the correlation of structures of principle classes of organic compounds with their properties, introduction to organic reaction mechanisms, chemistry of polyfunctional compounds including macromolecules of biological significance.

Goals Organic chemistry can be a particularly daunting subject. The reactions that occur in carbon-containing compounds can seem like a laundry list of different, unrelated events. However, these different reactions are all tied together by a few *fundamental principles*. By mastering these principles, and seeing how these fundamentals apply to different functional groups and reactions, organic chemistry becomes much simpler, and you will find you can apply them to problems that you've *never encountered before*.

Further Information about disabilities, final exams, inclement weather, incomplete grades, etc. can be found in the university-wide syllabus attachment located at http://www.okbu.edu/academics/forms/Syllabus_Attachment_Fall09.pdf.

Academic Dishonesty will not be tolerated. Offenses will result in a zero for the assignment, and may result in disciplinary action by the University. Academic dishonesty may include, but is not limited to:

- Copying from another student's exam or quiz.
- Sharing data analysis with your lab partner or other students.
- Insufficient rewording of material derived from another source.

Integration of Faith and Learning A Christian worldview provides us with the confidence that the world is governed by an orderly Creator. While many of the reactions we study may seem unrelated and confusing, the principles that govern the reactions are fairly simple, and allow us to make many predictions about reactions we haven't even seen yet.

Attendance Attendance will not be taken in this course. However, you are responsible for the information presented in class. In addition, your participation in class will not only help yourself, it also helps me identify that you are putting in a significant effort in the class.

Grades The value of each assignment for the semester is listed below:

Midterm Exams	300 pts
Final Exam	100 pts
Quizzes	100 pts
Lab	200 pts
Group Presentations	50 pts
Total	750 pts

Grading Scale Grades will tentatively be assigned according to the following scale: 85-100%–A, 75-84%–B, 65-74%–C, 55-64%–D, below 55%–F. These scales may be adjusted downward, but don't count on it.

Exams Midterm exams will be held during normal class periods on Wednesdays on *September 23, October 21 and November 18.* Each exam will be worth 100 points, and will test the material covered in lecture from each section of the course. The final exam will be held at the university-appointed time (currently Wednesday, December 16 at 1:00 PM), will be worth 100 points, and will cover material from the entire semester (comprehensive).

Quizzes There will be a quiz almost every Wednesday testing your comprehension of the material covered since the previous week. The major exceptions to this quiz rule will be on Wednesdays of an exam. Each quiz will be worth 10 points. In addition, there will be up to five extra credit quizzes given unannounced at the beginning of other class periods.

Homework problems will be assigned from the end of the chapter problems. These problems should be completed by the lecture after the chapter is completed. Most of the time, these homework problems will not be collected; however, a few times during the semester I will collect the problems at the beginning of class and grade 5 randomly selected problems for a total possible score of ten points. These points will serve to replace a low quiz score. Note: work must be shown for each problem in order for credit to be earned.

Tutoring will be available in Wood 102 on Tuesdays, Thursdays and Sundays from 7-9 PM. The tutors are there to answer questions and address specific problems, not to serve as an additional lecture.

Presentation You will be required to give a 10-15 minute presentation about a scientist who has contributed to our understanding of organic chemistry. You will work on the presentation in pairs, but you will give the presentation individually. The presentation will be given during the last lab period of the semester during the week of *December 7.* The slides for your presentation should be in OpenOffice.org Presentation format or Microsoft PowerPoint format, and should be given to Dr. Malmberg by noon of that day. More details regarding the presentation will be given later in the semester.

Due dates for Presentation:

November 6 Select presentation partner and topic by adding your names (and the name of the scientist) to the list posted on Dr. Malmberg's door. One partner will need to present on Tuesday, and one on Thursday. Topic priority will be given to those who sign up first.

December 4 Show outine of presentation to Dr. Malmberg (not required but recommended).

December 8–10 Give presentations.

Late Policy Exams, quizzes and homework must be completed on the days on which they are given. Failure to take an exam or quiz in the alloted time will result in a zero for that exam or quiz. Those who arrive late for a quiz must finish their quiz before those who arrived on time. Exceptions to this policy will be made for exams which are missed because of:

- University-sponsored activities. You must make alternative arrangements with me at least a week in advance.
- Documented medical absence.
- Death in the family.

Lab reports that are turned in late will be subject to penalties described in the lab syllabus. Exceptions will be made as for exams and quizzes.

Tentative Lecture Schedule Fall 2009

Week	M	W	F	Topic
8/26–8/28		Chap.1	1	Chemical Structures, Acid/Base Chemistry
8/31–9/4	2	2	2	Nomenclature, Properties of Organic Compounds
9/7–9/11	Labor Day	3	3	Alkenes, Organic Reactions
9/14–9/18	3	4	4	Reactions of Alkenes
9/21–9/25	4	Exam 1	5	Electrophilic Addition Reactions
9/28–10/2	5	5	5	Stereochemistry
10/5–10/9	6	6	6	Reactions of Alkynes
10/12–10/16	7	7	Free Days	Electron Delocalization
10/19–10/23	7	Exam 2	8	Reactions of Dienes
10/26–10/30	8	8	8	Nucleophilic Substitution Reactions
11/2–11/6	9	9	9	Elimination Reactions
11/9–11/13	9	10	10	Reactions of Alcohols
11/16–11/20	10	Exam 3	10	Reactions of Amines, Ethers, Thiols
11/23–11/27	10	Thanksgiving Holiday		No Reading
11/30–12/4	11	11	11	Reactions of Alkanes
12/7–12/11	11	Review	Review	Radical Reactions

Topics by Chapter The following topics will be covered in this course:

Chap. 1 Atomic Structure, Orbitals, Bonding, Polarity, Structure Representation, Definitions of Acids and Bases, pKa and Effects of Structure

Chap. 2 Nomenclature of Alkanes, Cycloalkanes, Alkyl Halides, Ethers, Alcohols, and Amines, Functional Groups, Physical Properties, Conformations of Straight-Chain and Ring Molecules, Factors Affecting Conformational Stability

Chap. 3 Degrees of Unsaturation, Nomenclature of Alkenes, Structure of Alkenes, Cis-trans Isomers (Nomenclature), Reaction Mechanisms, Nucleophiles and Electrophiles, Thermodynamics and Kinetics

Chap. 4 Addition of Hydrogen Halides to Alkenes, Carbocation Stability, Hammond Postulate, Regioselectivity of Electrophilic Addition, Addition of Water and Alcohols, Carbocation Rearrangements, Addition of Halogens, Epoxidation, Oxymercuration-Reduction, Hydroboration-Oxidation, Radical Stability, Radical Addition of HBr, Addition of Hydrogen, Alkene Stability

Chap. 5 Chirality, Stereocenters and Asymmetric Carbons, Enantiomers, Perspective Formulas and Fischer Projections, R-S Nomenclature, Optical Activity, Diastereomers, Meso Compounds, Absolute and Relative Configurations of Asymmetric Carbons, Regioselective, Stereoselective, and Stereospecific Reactions, Stereochemistry of Addition Reactions

Chap. 6 Nomenclature of Alkynes, Structure of Alkynes, Addition Reactions of Alkynes, Addition of Hydrogen Halides and Halogens, Addition of Water, Hydroboration-Oxidation, Addition of Hydrogen, Acidity of Terminal Alkynes, Acetylide Ion Synthesis, Multistep Synthesis I

Chap. 7 Delocalized Electrons, Resonance Contributors and Resonance Hybrids, Resonance Energy (Qualitative), Allylic and Benzylic Cations and Radicals, Effects of Delocalization on Reactions, Effects of Delocalization on pKa, Molecular Orbitals and Delocalization, Nomenclature of Dienes and Other Molecules with Multiple Functional Groups, Configurational Isomers of Dienes, Stabilities of Dienes, Addition Reactions of Isolated Dienes, Addition Reactions of Conjugated Dienes, Thermodynamic and Kinetic Control of Reactions, Diels-Alder Reactions, UV/Vis Spectroscopy and Effects of Conjugation

Chap. 8 Reactions of Alkyl Halides, Mechanism of S_N2 Reactions, Factors Affecting S_N2: Leaving Group, Nucleophile, Solvent, Sterics; Reversibility of S_N2; Mechanism of S_N1; Factors Affecting S_N1; Stereochemistry of Nucleophilic Substitution; Benzylic, Allylic, Vinyl and Aryl Halides; Competition Between S_N2 and S_N1; Role of Solvent Reactions, Stereochemistry, Solvent Effects

Chap. 9 Elimination Reactions: E2 mechanism, Regioselectivity and Zaitsev's Rule, E1 reactions, Competition Between E2 and E1, Stereochemistry of Elimination Reactions, Elimination from Cyclic Compounds, Competition Between Substitution and Elimination, Williamson Ether Synthesis, Synthesis Reactions Using Substitution and Elimination Reactions, Intramolecular Reactions

Chap. 10 Substitution Reactions of Alcohols, Amines and Substitution Reactions, Alcohols to Alkyl Halides, Alcohols to Sulfonate Esters, Dehydration Reactions, Substitution Reactions of Ethers, Reactions of Epoxides, Thiols, Sulfides and Sulfonium Salts, Organolithium Compounds, Grignard Reagents and Gilman Reagents

Chap. 11 Alkane Reactivity, Halogenation of Alkanes, Product Distribution Factors, Reactivity-Selectivity, Radical Substitution at Allylic and Benzylic Carbons, Stereochemistry of Radical Substitutions, Reactions of Cyclic Compounds

Success in organic chemistry generally requires a considerable effort both in and out of the classroom. To maximize your opportunities for a good grade in this class, consider the following suggestions:

1. Get some sleep. This class meets early in the morning, and a well-rested mind will understand lectures better and perform better on exams.
2. Read the material to be covered in lecture before coming to class. I will make an effort to let you know what we will cover in the next lecture.
3. Ask questions and answer questions during class. You can gauge your understanding of the current material much better if you can answer questions or ask questions about the material. Conversely, it's easier to trick yourself into thinking you know more than you do if you don't participate.
4. Read the material that was just covered in the previous lecture.
5. Do the homework problems assigned in class. These will not usually be graded, but they will give you practice in utilizing the material from class, and give you a better understanding of what might be on quizzes and exams.
6. Attend tutoring sessions(Wood 102 TuThSu 7-9). The tutors know what is going on in organic chemistry, and they may have insights to how I write exams. Even if you don't have specific questions to ask them, you may be able to learn from other people's questions.
7. Don't wait to get help. If you underperform on a quiz or two, don't assume the problem will correct itself. If you wait until halfway through the semester to right the ship, you will likely find yourself in a situation that you can't fix, one in which all of your alternatives will be undesireable.