Chemistry 256
Organic Chemistry II Lecture
Spring 2015

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"UNLESS someone like you cares a whole awful lot, nothing is going to get better. It's NOT." (The Lorax)

Class Schedule

Lecture (Kirkbride 149)
MWF 9:00 am – 9:50 am
Workshop:
Section A (Kirkbride 447): W 2:00 pm – 2:50 pm
Section B (Kirkbride 447): M 2:00 pm – 2:50 pm
Section C (Kirkbride 447): F 2:00 – 2:50 pm
Exams: (Kirkbride 149): Th 5:30 pm – 7:00 pm
February 11th
March 17th
April 14th
May 5th

Required Textbooks and Materials

Organic Chemistry: Principles and Mechanisms, Joel Karty, ISBN 978-0-393-91904-2
Study Guide and Solutions Manual to accompany Organic Chemistry: Principles and Mechanisms by Joel Karty and Marie M. Melzer, ISBN 978-0-393-92293-6
Molecular Visions Molecular Model Kit by Darling Models are ***highly*** recommended but you may use other model kits if you prefer, and you are welcome to share a set with a classmate. ISBN 0-9648837-2-4

Office Hours

Monday 3 – 4 pm
Tuesday 9 – 11 am
Wednesday 12 – 1 pm
Thursday 9 – 10 am
and by appointment

Course Description

In this course we continue are journey through organic chemistry. Organic chemistry was traditionally defined as the study of substances isolated from living systems. While organic chemistry opens the door to the understanding of living systems including but not limited to protein chemistry and pharmaceuticals, organic chemistry is also the basis of materials chemistry which has given us such commercial materials as fiberglass, plastic, lasers, and computers to name a few. This is the second semester of a two-semester introductory organic chemistry sequence for science, engineering, and pre-med programs. We will continue to learn methods that allow us to control the formation and breaking of covalent bonds in order to produce chemicals with desired structures and properties while not harming the environment. The course emphasizes the nomenclature, structure, properties, and identification (IR, ^{1}H-NMR, ^{13}C-NMR, and MS) of a large number of classes of organic compounds. The course also provides an introduction to alternative green reagents/reactions and multistep synthesis.
Prerequisite: Chem 255 and 257.

Course Goals

We have three major goals in this course: 1) to promote effective written and oral communication of chemical nomenclature and structures of organic molecules (the language of organic chemistry); 2) to promote a basic knowledge of the concepts of organic molecules and their relationship to mathematics and other sciences in order a) to compare theoretical calculations and experimental results, b) to interpret spectra, c) synthesize and characterize compounds, and d) to recognize how chemistry relates to other disciplines and society; 3) to develop problem solving and analytical analysis

skills. This knowledge will be judged based on start-ups, exams, and class participation.

Readings

The purpose of the readings is to prepare you for and supplement the lectures. You **MUST** read the assigned readings **before** the appropriate class (as outlined later), because I do not cover every detail of the readings and my lectures will be prepared based upon the assumption that you have prepared for class. My lectures incorporate several different teaching styles. First, I do ask questions during lecture and I expect thoughtful answers. Answering these questions requires that you have thoughtfully read the assigned material. Second, there will be days where you are asked to solve and present questions during class. If you have not prepared for class, you will find difficulty solving these problems and you will gain little knowledge from this extremely useful experience. Third, I do not cover every detail of the readings and you are responsible for all of the material unless otherwise noted by myself in class.

Class Activities

Class activities will include the presentation of new material and discussion of new and old material including sample problems, group problems, lecture, and questions. Although Brown will provide the basic knowledge of each topic, we will discuss aspects of the topics that are not covered by this tertiary textbook. We will delve into the history of many of the founding discoveries in organic chemistry in order to gain a greater perspective of our subject. We will also move beyond the coverage in the text for some topics and also discuss how organic chemistry affects your life everyday. These additional topics are meant to spawn an excitement for organic chemistry and to catalyze in-class discussions.

Grading

Startups (14 at 10 pts each)	140 pts
Exams (4 at 100 pts each)	400 pts
Final Exam	200 pts
Class Attendance/Participation	60 pts
Total	800 pts

Class Attendance/ Participation

Since organic chemistry is a subject that requires your consistent dedication, you are expected to attend and participate in all class meetings and activities. A significant portion of your grade will be based upon your class participation, frequency and quality of questions, and preparedness and attendance of class based upon my subjective evaluation. Also, you will receive a failing grade in the course if you miss 9 or more class meetings.

Startups/ Workshop Exercises

Startups are sets of problems that are designed as pre-class meeting assignments to prepare you for the workshop (Monday or Wednesday class meeting) exercises and to give you practice applying your knowledge to problems. These startups are designed to be completed after reading of the appropriate sections of the textbook and to elaborate upon certain topics. The startups are submitted by hand for grading **prior to the beginning** of the appropriate class (as indicated in the schedule at the end of the syllabus). They will **not** be accepted once class has begun. The startups can be found on my Chem 256 website 1 week before the class in which they are due. The solutions will also be posted on the Chem 256 website by Friday of the appropriate week. These startups are designed to prepare you for the class exercises and gage your comprehension of the material covered during the previous week, so if you have any problems with the questions, you are welcome to ask questions during office hours.

The *workshop exercises* are group problem-solving activities designed to further your understanding of the material and to clarify questions that arose during your readings and completion of the startups. If your group does not complete the assignment during class time, your group is expected to complete the exercise outside of class.

Exams

You will have 4 mid-term exams and a final exam. These 5 exams provide a way for you to demonstrate your knowledge of the course through problem solving questions in addition to questions that test your conceptual understanding and general knowledge of the material. The only way to do well on the exams is to **practice**, **practice**, and then **practice** more. I suggest you review the start-up assignments, the workshop exercises, attempt ***all*** of the questions at the end of each chapter, and work through the practice exams. The practice exams may be found on my Chem 256 website 1 week before each exam. You will find this very rewarding when the exams roll around. Also, I have an abundance of organic chemistry textbooks in my office that I would be delighted to loan you if you want/need additional problems.

The final exam is ***cumulative***. If your percentage score on the final exam is higher than any one of the midterm exams, I will replace your lowest exam score with your percentage score on the final exam.

IF YOU ARE ABSENT FROM AN EXAM IT WILL COUNT AS A ZERO. There are no make-up exams given except 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 of 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.

Discussions

Optional discussion sections will be scheduled just before each exam and will usually meet in the evening at a mutually convenient time.

Grading Scheme

Grading will be on a curve. The following grading scale will be used:

A	85%
B	75%
C	65%
D	54%

So, if you collect 75% of the points, you are guaranteed a "B". If you score very near (~1-2%) one of the borders, you will likely receive the higher grade with a minus sign affixed or the lower grade with a plus sign, but that is not guaranteed.

These cutoffs are not arbitrary. They are derived from experience with this course over several years. However, the cutoffs are absolute. If everyone is above 85%, then everyone gets an A and vice-versa.

I am providing an absolute scale for several reasons. First, I want to encourage collaboration between everyone. Working in groups can be extremely useful, so I don't want you competing with one another. Second, I want you to be informed throughout as to the score you need in order to achieve your goal for the course. I do reserve the right to lower the cutoffs.

Electronic Devices

Use of electronic devices for non-class activities is not allowed.

Class Cancellation

If a lecture or lab section is cancelled for any reason, you will be notified via Widener email.

Academic Integrity

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.

Grievance Procedure Please refer to the student handbook, the science office, or myself if you have a problem.

Syllabus Modification I reserve the right to change/modify the syllabus throughout the semester if needed. All changes will be announced in class and you are responsible for those changes whether you are present or absent during those class times.

Learning and Studying Organic Chemistry

Organic Chemistry and your sophomore year represents a significant jump in your intellectual growth path. This year you will make significant strides up "Bloom's Taxonomy of Learning" and begin to realize your intellectual abilities. Much of your education to this point as focused on the acquisition of knowledge and comprehension of that knowledge with a little emphasis on application and analysis in your freshman courses. These lowest levels of Bloom's taxonomy can be reached by memorization and last minute studying; however, that will not be the case this year and particularly in Organic Chemistry. Organic Chemistry focuses on the application, analysis, and synthesis of information. These intermediate levels of Bloom's Taxonomy can not be reached by memorization and last minute studying, they require slow digestion of material over the course of time and a true understanding of the material in order to apply, analyze, and synthesize the material that you have learned. Please refer to the handout, "How to Study for Organic Chemistry" for more information.

Bloom's Taxonomy of Learning (from Benjamin S. Bloom *Tazonomy of educational objectives*)

Competence	Skills Demonstrated	Question Cues
Knowledge	▪ Observation and recall of information ▪ Knowledge of dates, events, places ▪ Knowledge of major ideas ▪ Mastery of subject matter	List, define, tell, describe, identify, show, label, collect, examine, tabulate, quote, name, who, when, where, etc.
Comprehension	▪ Understanding information ▪ Grasp meaning ▪ Translate knowledge into new context ▪ Interpret facts, compare, contrast ▪ Order, group, infer causes ▪ Predict consequences	Summarize, describe, interpret, contrast, predict, associate, distinguish, estimate, differentiate, discuss, extend
Application	▪ Use information ▪ Use methods, concepts, theories in new situations ▪ Solve problems using required skills or knowledge	Apply, demonstrate, calculate, complete, illustrate, show, solve, examine, modify, relate, change, classify, experiment, discover
Analysis	▪ Seeing patterns ▪ Organization of parts ▪ Recognition of hidden meanings ▪ Identification of components	Analyze, separate, order, explain, connect, classify, arrange, divide, compare, select, explain, infer
Synthesis	▪ Use old ideas to create new ones ▪ Generalize from given facts ▪ Relate knowledge from several areas ▪ Predict, draw conclusions	Combine, integrate, modify, rearrange, substitute, plan, create, design, invent, what if?, compose, formulate, prepare, generalize, rewrite
Evaluation	▪ Compare and discriminate between ideas ▪ Assess value of theories, presentations ▪ Make choices based on reasoned argument ▪ Verify value of evidence ▪ Recognize subjectivity	Assess, decide, rank, grade, test, measure, recommend, convince, select, judge, explain, discriminate, support, conclude, compare, summarize

Tentative Lecture Schedule

Date	*Topic*	*Reading*
Week 1 1/19 – 1/22	Introduction and Syllabus Electrophilic Addition to Nonpolar π Bonds 1 *Monday, 1/18: NO CLASS – MLK Day* *NO Workshop Sessions*	Chapter 11
Week 2 1/25 – 1/29	Electrophilic Addition to Nonpolar π Bonds 2 *Workshop Topic: Reactions (Chapters 10 and 11)* **Startup #1 – Due Monday, 1/25**	Chapters 11 (cont) and 12
Week 3 2/1 – 2/5	Electrophilic Addition to Nonpolar π Bonds 2 (cont) *Workshop Topic: Reactions of nonpolar* π bonds **Startup #2 – Due Monday, 2/1**	Chapter 12
Week 4 2/8 – 2/12	Organic Synthesis 1 *Workshop Topic: Reactions* **Startup #3 – Due Monday, 2/8** ***Exam #1: Thursday, 2/11, 5:30-7pm***	Chapter 13 ***Chapters 11 and 12***
Week 5 2/15 – 2/19	Conjugation and Aromaticity *Workshop Topic: Synthesis* **Startup #4 – Due Monday, 2/15**	Chapter 14 Nomenclature 2.2
Week 6 2/22 – 2/26	Aromaticity (cont) *Workshop Topic: Aromatics & Synthesis* **Startup #5 – Due Monday, 2/22**	Chapter 14
Week 7 2/29 – 3/4	UV-Vis and IR Spectroscopy *Workshop Topic: IR Problems* **Startup #6 – Due Monday, 2/29**	Chapter 15
Week 8 3/7 – 3/11	*NO CLASS – Spring Break*	*Enjoy!!*
Week 9 3/14 – 3/18	NMR Spectroscopy *Workshop Topic: Symmetry* **Startup #7 – Due Monday, 3/14** ***Exam #2: Thursday, 3/17, 5:30-7pm***	Chapter 16 ***Chapters 13, 14, 15, N2.2***
Week 10 3/21 – 3/25	Nucleophilic Addition to Polar π Bonds 1 *Workshop Topic: Spectral Problems* *Friday, 3/25: NO CLASS – Spring Holiday* **Startup #8 – Due Monday, 3/21**	Chapter 17
Week 11 3/28 – 4/1	Nucleophilic Addition to Polar π Bonds 1 (cont) *Workshop Topic: Nomenclature* **Startup #9 – Due Monday, 3/28**	Chapter 17 Nomenclature 4
Week 12 4/4 – 4/8	Nucleophilic Addition to Polar π Bonds 2 *Workshop Topic: Nomenclature* **Startup #10 – Due Monday, 4/4**	Chapter 18 Nomenclature 4
Week 13 4/11 – 4/15	Nucleophilic Addition to Polar π Bonds 2 (cont) Organic Synthesis 2 *Workshop Topic: Synthesis* **Startup #11 – Due Monday, 4/11** ***Exam #3: Thursday, 4/14, 5:30-7pm***	Chapter 18 Chapter 19 ***Chapters 16, 17, N4***
Week 14 4/18 – 4/22	Nucleophilic Addition-Elimination Reactions 1 *Workshop Topic: Synthesis* **Startup #12 – Due Monday, 4/18**	Chapter 20
Week 15 4/25 – 4/29	Nucleophilic Addition-Elimination Reactions 2 *Friday, 4/29: NO CLASS – Student Project Day (extra credit!)* *Workshop Topic: Synthesis* **Startup #13 – Due Monday, 4/25**	Chapter 21

Week 16 5/2 – 5/6	Electrophilic Aromatic Substitution *Workshop Topic: EAS* **Startup #14 – Due Monday, 5/2** ***Exam #4: Thursday, 5/5, 5:30-7pm***	Chapters 22 and 23 ***Chapters 18, 19, 20, 21***
Week 17	**Final Exam** *Wednesday, May 11, 2016, 10:15 am – 12:15 pm*	**Cumulative + 22 & 23**