

Organic Chemistry 32-335 Syllabus

Lecture Instructor: Dr. L. Xie (pronounced as "Shea")

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Office Hours: M T W F 10:00-11:00 am or by appointment

Lecture: M W F 11:30-12:30, Halsey 175

Lab: Section 1: 1:50-5:10 (Mon.), Section 2: 8-11:10 (Tue.), Section 3:
1:50-5:10 (Wed.)

Textbook and Study Guide:

- L.G. Wade "Organic Chemistry" with Solutions Manual, 5th Ed., 2002, Prentice-Hall. (Required)
- Xie, L. "335 Lecture Notes" (Gold cover), available in the bookstore or electronically distributed (recommended).

Laboratory Books:

- 32-335 Organic Chemistry II Laboratory Manual. (Dark Green cover, Required)
- Pavia, et al. Techniques in the Organic Laboratory, 1st Ed., Harcourt College Publishers. (required)
- A Bound Notebook. (required) A spiral notebook is NOT acceptable.

Objectives:

The following subjects will be emphasized:

1. Theories and techniques of important organic spectroscopy. In particular, infrared, nuclear magnetic resonance (NMR), and Mass spectrometry will be presented and used to identify structures of organic compounds.
2. Discussion of chemical reactions of ethers, conjugate polyenes, aromatic compounds, carbonyl compounds, amines, acids and their related compounds. Emphasis will be placed on the mechanistic aspects of these reactions and their synthetic applications. Conventional electron pushing will be employed in mechanism writing.
3. Further development of organic synthesis skills using various reactions.
4. Theoretic aspects of bonding, aromaticity, resonance structures and other important concepts.

Evaluation of Performance:

The grades will be based on four hourly exams (400 total points) and your laboratory performance (200 total points). The maximum point possible for the course is 600. There will be no extra credit from any other sources.

- Four hourly exams each worth 100 points will be given in lecture on the tentative dates listed in the lecture schedule on the last page of this document. (400 points)
- A laboratory grade of 200 points will be based on prelab questions, laboratory reports, notebook, a poster project, and a lab quiz.

The grade will be based on the standards I expect from the class and the average class performance. In the past there has been no need for “curving” the grade. However, curving may be implemented if necessary. The following is a general scale for grade distribution:

Point Percentage (<i>out of Total Points</i>)	Grade
>=90%	A
>=80%	B
>=70%	C
>=60%	D
<=55%	F

This scale is tentative and the instructor reserves the right to assign a grade different from the above scale by taking into consideration of motivation, participation, and efforts.

Course Policies and Study Hints:

1. Four hourly exams will be given during the regularly scheduled lecture time. NO exam can be taken after the scheduled date. Missing a scheduled exam without **prior** permission (call or email before the exam is given unless it's an emergency situation) from your instructor will result in no credit for that exam.
2. Laboratory is an integral part of this course. Missing **TWO** scheduled lab experiments without permission from your instructor will result in a grade of F in the lab, and consequently an F in this course. If you have to miss a lab, inform your lab instructor and try to set up a time for make-up. If a make-up is impossible, ask for your instructor's permission to turn in the lab report so that you can receive a prorated score for that particular lab.
3. You should not change your lab section without prior permission of your instructor.
4. Problem assignments are given in the package of lecture notes (available in the bookstore), and should be worked out promptly following each lecture. Try to work out each problem yourself at least twice before checking into the "Solutions Manual".
5. Study Hints: 1) attend classes with preparation (read 8-12 pages of textbook before coming to lecture); 2) take notes; 3) study regularly; 4) solve as many assigned problems as possible; 5) DO NOT fall behind.

Laboratory

- Laboratory experiments will not start until the beginning of the second week. During the first week, you should read the assigned material and be prepared for the first experiment. These include some parts of the Pavia's Manual and the 335 Lab Manual. Required readings are listed at the beginning of each experiment under the heading "required reading". You should also read this hand-out carefully for additional information. Prelab sheets will be distributed one week before each lab and will be collected at the **beginning** of each actual lab.
- Organic laboratory and lecture complement each other. The lecture supplies fundamental theory about molecular and electronic structure, chemical reactions, and their mechanisms. In the laboratory you will put this knowledge into practice and learn supplementary theoretical concepts and mechanisms when necessary to help you more fully understand the chemical process in progress.

The following is a typical procedure you should follow for each laboratory experiment:

1. Prelab: Answer prelab questions. Read each experiment in the lab manual **before** coming to the laboratory. These include the theories related to each experiment, required reading materials, and procedures involved in each experiment.
2. Preparation of Notebook: After the above reading, prepare your notebook as described in Chapter 2 of ORGANIC CHEM LAB SURVIVAL GUIDE. Your notebook will be **checked** by your instructor at the beginning of each experiment! 2-5 points will be deducted for each unprepared notebook writing. The following lists some recommended items to be included in your lab preparation: (items with \checkmark mark are to be done before each lab and those with \bullet should be done **during** and after the lab, see entry 4.)
 - \checkmark Page number: print the number consecutively.
 - \checkmark Date: the date when the experiment was performed.
 - \checkmark Title: a brief title of the experiment to be performed.
 - \checkmark Purpose: the purpose of running each experiment (in your own words).
 - \checkmark Main reaction: write the main reaction involved in each experiment (for exploratory experiments, you may not need to write one).
 - \checkmark Physical constants of main reagents: list all the **key** reagents in a table format; look up their molecular weight (MW), boiling point if any (b.p.), melting point (m.p.), and density. (These numbers will help you decide, e.g., which layer to take, how fast to heat, what solvent to use, etc.)
 - \checkmark Experimental procedure: list a brief procedure as to how the experiment is to be done. Leave some space for recording
 - Observations (such as color change, solid formation, gas released, etc.)
 - Calculations: list the actual amount of all reagents used; record the weight of products, GC peak area, retention time, m.p., b.p., and **other raw data**. Then calculate moles, limiting reagent, yield, etc.
 - Conclusion and comments: if you have any comments or conclusions to make in terms of the success or failure of the experiment.
3. Begin the experiment: Discussion of the theory and concepts involved in each experiment will be given by your instructor at the beginning of each lab period. Arrive **on time** for the discussion!

4. During the experiment: Record all data and observations in your notebook *while you are working, not after!* Refer to entry 2 above for what to record in the notebook.
5. End of the experiment: Check to make sure chemical wastes are properly disposed of, bench cleaned, all community items returned to their original places.
6. Postlab: Write up the discussion and conclusion part of the experiment, calculate the yields and work on the lab report. Do them as soon as possible so that the experimental details are still "fresh".
7. Submit your lab report at the **beginning** of the next experiment.
8. Physical constants can be found in many chemistry handbooks. Here are the most common ones you may use in this course (see Pavia's book on how to use these handbooks):

CRC Handbook of Chemistry and Physics QD 65 .H3

Available at the *Polk Reference Desk, Halsey Resource Center Reserve*, and on the shelf in the *Polk main collection*.

Aldrich Catalog Handbook of Fine Chemicals

On reserve at the Halsey Resource Center and also available in the organic labs.

Merck Index

Happy Experimenting

Tentative Lecture and Exam Schedule

<u>Week</u>	<u>Starting Dates</u>	<u>Topic</u>	<u>Chapter</u>
1	2/2	Spectroscopy (IR & MS)	12
2	2/9	Spectroscopy (MS, NMR)	13
3	2/16	Spectroscopy (NMR)	13
4	2/23	Ethers & Epoxides	14
5	3/1	<i>Exam #1: March 5</i>	
6	3/8	Conjugated Systems	15
7	3/22	Aromatic Compounds	16
8	3/29	Aromatic Substitution Reactions	17
		<i>Exam #2: April 2</i>	
9	4/5	Aldehydes and Ketones	18
10	4/12	Enols and Enolate Ions	22
11	4/19	Amines	19
		<i>Exam #3: April 23</i>	
12	4/26	Carboxylic Acids	20
13	5/3	Carboxylic Acid & Derivatives	21
14	5/10	Carboxylic Acid & Derivatives	21
		Lab Quiz during lecture	
		<i>Exam #4: May 14</i>	