

CHEM 345 Organic Chemistry I
Spring 2016

Instructors

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Stockroom Manager:

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Prerequisite: A letter grade of “C” or better in **Chem 102** or **106** or the equivalent course transfer.

Contacting Instructors and TAs: We will be using Blackboard (BB) Learn as our course website. All instructors and TAs can be contacted via BB Learn email. Please put “chem 345” in the subject field of the email.

Office Hours:

- Dr. Berkman: M/W/F 2:00-3:00 pm and by email appointment.
- TA office hours are held in Fulmer 401 as well as CUE tutoring center. A schedule will be posted on the *course website* as well as on the *door to Fulmer 401* no later than the first week of class.

Class Meeting:

- Section 1 MWF 13:10-14:00 (1:10-2:00 pm) **Heald G3**
- Prelab meeting times depend on section. *All labs meet in Fulmer 438 beginning the week of January 25th.*

Course Website: All course material is on our website at:

- <http://learn.wsu.edu>
- In addition, we have a course Facebook group page at: <http://www.facebook.com/groups/chem.345>

Required Course Materials: This term will use *Bruice's Organic Chemistry (7th edition)* with *Mastering Chemistry* for online homework as well as *Learning Catalytics* for classroom response technology. There are **three options**:

- 1) Purchase the book and Mastering Chemistry access for \$176.00 at Crimson & Gray or \$168.15 at the Bookie.
- 2) For those of you with a laptop or 3rd or 4th generation iPad (those with retina displays) you may opt for the eBook and Mastering Chemistry access for \$120.00 at Crimson and Gray or \$109.30 at the Bookie. Please be aware that if you select this option, the only tablet that displays the eBook well is an iPad with retina display. Laptops all work but Android devices shrink the text so it requires magnification and it is not easy to read.
- 3) Purchase Mastering Chemistry *with* or *without* the eBook when you register through Blackboard Learn - **know your Pearson ID**
 - a. The cost is \$90.00 Mastering Chemistry with the eBook or,
 - b. \$66.00 for Mastering Chemistry without the eBook. This option requires a separate purchase of Learning Catalytics for \$12.00 that brings the total cost to \$78.00.

Mastering Chemistry and *Learning Catalytics* are necessary for whatever option you select. Mastering Chemistry support can be found at <http://247pearsoned.custhelp.com/> In addition, WSU is a priority customer so you have access to phone tech support at 855-875-1797. If you contact support let your agent know you use *Modified Mastering* that is connected to BlackBoard Learn.

In addition to the text and Mastering Chemistry shown above, you will need an *organic model kit*. These can be very expensive, so be careful. A cheap model kit is http://www.darlingmodels.com/Individual-Orders-Molecular-Model-Kits/KIT-3-ISBN-978-09648837-4-1-MOLECULAR-VISIONS-Organic-Kit/prod_7.html Model kits can also be purchased on eBay or Amazon for a reasonable price. *It is essential you have a model kit before the first exam.*

Course Objectives and Description: Students completing Chem 345 will be able to:

- 1) Rationalize molecular reactivity based on functional groups,
- 2) Master the foundational knowledge necessary for success in Chem 348,
- 3) Master simple laboratory methods dealing with compound separation, identification, and synthesis, and
- 4) Safely manipulate chemical compounds and understand chemical hazards in the laboratory.

Lecture Course Description: The Chem 345 curriculum is based on the “survey of functional groups” approach to teaching organic reactions and mechanisms. Each week we will be exploring a different type of organic compound. Please consult the lecture topic outline section of the course web site and keep up with reading and homework.

Lab Course Description: Chem 345 has a laboratory component that meets once per week for 3 hours. *In order to pass the course, you must complete and pass all of the labs.* You are not required to purchase any lab manuals as all printed materials are freely available on the course website. *You are required to purchase a lab coat as well as goggles.*

- **You must complete and turn in all of the labs in order to pass this course.** In other words, failure to turn in a lab report at the end of the term will result in an automatic failing grade. Lab attendance is mandatory. If you miss a lab, there will be a make-up session at the end of the semester; you may make up a maximum of two labs. If you miss more than two labs during the semester without an excellent reason, you will automatically fail the course. If you cannot attend lab, you must email your TA and Andrea Kirchner-Loewus (andreakl@wsu.edu) before the scheduled lab time.
- **All labs must be turned in directly to your TA** the week following their completion or to the Organic Stockroom Fulmer 435 (Manager, Andrea Kirchner-Loewus). Your TA will sign the report acknowledging receipt and Andrea or the Organic Stockroom staff will date-stamp them.
- **Early Policy:** You will receive 0.25 points EXTRA CREDIT for each day you turn in your lab prior to the due date (maximum of 1 point per lab). If you wish to turn in a lab early, give it to your TA directly or Andrea/Organic Stockroom staff in 435 from 10-4 pm, Monday-Thursday (closed Fridays).
- **Late Policy:** There is none. Labs turned in after the due date will be scored as a 0 (zero) and counted as a completed lab, and thus cannot be made up at the end of the semester. If no stockroom personnel are present to accept your lab, you may drop it through the mail slot on the door to Fulmer 435A.

Student Learning Outcomes:

- 1) Use chemical acid/base reactivity to predict chemical equilibrium.
- 2) Describe chemical reactivity in terms of organic functional group chemistry, including functional group transformation.
- 3) Interpret structural changes within a chemical framework considering bond making and bond breaking.
- 4) Propose reasonable mechanisms that convert starting materials to product
- 5) Interpret stereochemical data that informs a mechanistic hypothesis.
- 6) Plan an organic synthesis using a retrosynthetic approach based on known chemical reactions.
- 7) Develop skill in safe chemical handling, measurements, experimental technique, and simple synthesis.
- 8) Plan simple compound separation schemes using solubility characteristics.

Assignments & Grading Policy: This course will be graded on the basis of homework, two midterm exams, a comprehensive final exam, lecture participation, and lab.

- **Homework:** We will be using *Mastering Chemistry* for online homework this term. All assignments will be accessible through Blackboard Learn and count at **10%** of your grade.
- **Midterm exams:** 2 hourly exams will be administered to assess subject mastery. Prior exams are provided on the course website. The second midterm exam (as well as the final) are comprehensive. Each midterm exam is **20%** of your grade. If you miss a midterm exam, your final exam will count as **45%** instead of 25%.
- **Final exam:** A 2-hour mandatory final exam will be administered at the end of the course. The final exam is worth **25%** of your grade.
- **Lecture participation:** *Learning Catalytics* will be used to assess lecture participation. Lecture participation is worth **5%** of your grade.
- **Lab:** Completing all 12 labs is required to pass this course and will count at **20%** of your grade.

Assessment: Student Learning Outcomes 1 through 7 will be assessed using hand-graded exams, homework, and in-class participation. We do not use multiple choice exams so we can assign partial credit for reasonable answers. Any chemical separations theory necessary to Student Learning Outcome 8 will also be assessed using exams. The remainder of outcomes 7 and 8 will be assessed by graded lab reports.

Grade Scale: This course will use the following grade scale. Please note this scale may change slightly from year-to-year.

		B+	86-88	C+	77-79	D+	65-68
A	92-100	B	83-85	C	72-76	D	61-64
A-	89-91	B-	80-82	C-	69-71	F	<60

Grade Summary: The breakdown for each of graded component is show below, along with their weight in percentage. A sample calculation is also provided.

		<i>sample calculation</i>				
<i>graded components</i>	<i>weight</i>	<i>score</i>	<i>x</i>	<i>weight</i>	<i>=</i>	<i>weighted score</i>
homework	10%	70	x	0.1	=	7.00
test 1	20%	67	x	0.2	=	13.40
test 2	20%	62	x	0.2	=	12.40
lecture participation	5%	88	x	0.05	=	4.40
final	25%	77	x	0.25	=	19.25
lab	20%	90	x	0.2	=	18.00
	100%	sum				74.45

In the sample calculation above, the composite score of 74.45 would round to 74 and correspond to a letter grade of “C” according to the grade scale. However, *since the final exam is comprehensive, we also consider that score alone and if it is better than the composite score, that will be the grade awarded.* For example, if the final exam score above was 77%, which corresponds to a letter grade of C+, so that is the grade awarded for the class.

composite score	final exam	best score	best letter grade
74	77	77	C+

We do not give make-up exams. *If you miss one hourly exam, the final exam will increase to 45% of your course grade.* To pass this course, you must complete all of the labs. *If you miss a lab, there will be make-up times available.*

Test Schedule: All tests and exams are evening exams. If you off campus due to a university sponsored event, you may arrange for an academic counselor to proctor the exam. You must make these arrangements within the first two weeks of the semester. If you miss an hourly exam, the final exam will count at 45%.

- Test 1, Thursday February 18 from 8:00 to 10:00 pm in Todd 116 & Fulmer 226
- Test 2, Thursday March 31 from 8:00 to 10:00 pm in Todd 116 & Fulmer 226
- Final Exam, Wednesday May 4 from 7:00 to 10:00 pm, location TBD

Tests 1 and 2 are written for a standard 1-hour time frame so it is permissible to start Test 1 or Test 2 up to 9:00 pm and still have time to complete the exam. The Final Exam is written for an average student to complete in 90 minutes. *If you have a conflict with another evening academic activity* such as a biology or physics lab course, talk with the lab instructor and ask for an alternate time. If arrangements can't be made with a conflicting lab, *let us know within the first two weeks of the course.* If you are sick and miss an exam, there is no penalty as it simply increases the weight of the final exam. Do not make travel plans before the final exam - your travel cannot be accommodated.

Test Policy and Regrades: In advance of exams, you will be provided with a *notecard* that you may bring to the exam. In addition to this notecard, bring only your *student ID*, a *model kit*, and pencils to the exams. You will be provided scratch paper. You may not bring any electronic or internet connected device to the exam. Do not bring or leave visible any

notes other than on your card. If you are observed using any electronic device, reading off fellow student's tests, or having notes other than allowed, you will fail the exam and be asked to leave the testing room, and it will be interpreted as a breach of academic integrity and will be reported. Once graded, **you may pick up your exams from the stockroom**. Look over the exam carefully and make sure the points have been added correctly. If you find an error or have a question about the grading of the exam, return it to the stockroom attendant with a regrade request form attached (you can get these from the stockroom or on the course website) – **we will not re-grade an exam once you remove it from the stockroom**. Be very clear when completing the regrade form. For example, "there is an error in my total points" or "on question 2, I drew the correct intermediate structure...." Avoid requests that include "I feel as if I deserve more points."

Lecture Schedule:

Week	Starting	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1	January 11	Lecture 1		Lecture 2		Lecture 3
Week 2	January 18	MLK Day		Lecture 4		Lecture 5
Week 3	January 25	Lecture 6		Lecture 7		Lecture 8
Week 4	February 1	Lecture 9		Lecture 10		Lecture 11
Week 5	February 8	Lecture 12		Lecture 13		Lecture 14
Week 6	February 15	President's Day		Review	Test 1	no lecture
Week 7	February 22	Lecture 15		Lecture 16		Lecture 17
Week 8	February 29	Lecture 18		Lecture 19		Lecture 20
Week 9	March 7	Lecture 21		Lecture 22		Lecture 23
Week 10	March 14	spring break				
Week 11	March 21	Lecture 24		Lecture 25		Lecture 26
Week 12	March 28	Lecture 27		Review	Test 2	no lecture
Week 13	April 4	Lecture 28		Lecture 29		Lecture 30
	April 11	Lecture 31		Lecture 32		Lecture 33
Week 14	April 18	Lecture 34		Lecture 35		Lecture 36
Week 15	April 25	Course Review		Course Review		Course Review
Finals	May 2			Final Exam 7-10 pm		

Lecture Topics: Given that we will only cover selected sections in the required textbook, the following map is provided. It is extremely important that you follow this map when studying for this course. Sections that we will not cover will be explicitly listed below. In addition, we will not cover all reactions listed in each section, therefore **a reactions list is provided by chapter to help you focus on the necessary functional group transformations**. Lecture slides will be available for download before the day of the lecture on the course website.

Chapter 1 – Remembering General Chemistry: Electronic Structure & Bonding. This chapter should be review from general chemistry.

Section 1.1 Pay attention to the definition of isotopes.

Section 1.3 is a particularly important review

Section 1.4 reviews how to draw Lewis structures and determine formal charge. This task is required throughout the semester on both homework and exams.

Section 1.6-1.15 will be thoroughly reviewed in lecture

Chapter 2 – Acids & Bases: Central to Understanding Organic Chemistry. As with Chapter 1, much of the information in this chapter is a review of concepts presented in general chemistry. It is essential that you develop a strong command of acid/base chemistry.

Section 2.10 will be covered in a worksheet lab

Section 2.11 may be ignored

Chapter 3 – An Introduction to Organic Compounds: Nomenclature, Physical Properties, & Representation of Structure

Section 3.15 may be ignored

Chapter 4 – Isomers – The Arrangement of Atoms in Space. This chapter is made difficult because of the need to recognize three dimensional arrangements of atoms. On every exam, you will be allowed to use your model kit.

Sections 4.10, 4.15, & 4.16 may be ignored

Chapter 5 – Alkenes: Structure, Nomenclature, & an Introduction to Reactivity. We will deal very qualitatively with the concepts presented in this chapter. You will not be required to perform any calculations.

Chapter 6 – The Reactions of Alkenes: The Stereochemistry of Addition Reactions

Sections 3 6.3, 6.7, 6.8, 6.14, 6.16, & 6.17 may be ignored

Chapter 7 – The Reactions of Alkynes: An Introduction to Multistep Synthesis

Sections 7.5, 7.6, 7.7, 7.8, & 7.12 may be ignored

Chapter 8 – Delocalized Electrons & Their Effect on Stability, pKa, & the Products of a Reaction

Sections 8.11, 8.12, 8.14, 8.18, 8.19, 8.20, & 8.21 may be ignored

Chapter 9 – Substitution Reactions of Alkyl Halides

Sections 9.7 & 9.9 may be ignored

Chapter 10 – Elimination Reactions of Alkyl Halides: Competition Between Substitution & Elimination

Chapter 11 – Reactions of Alcohols, Ethers, Epoxides, Amines, & Thiols

Sections 11.8, 11.10, & 11.12 may be ignored

Chapter 16 – Reactions of Carboxylic Acids & Carboxylic Derivatives

Sections 16.18, 16.22, & 16.23 may be ignored

Chapter 17 – Reactions of Aldehydes & Ketones: More Reactions of Carboxylic Acid Derivatives. Reactions of α,β -Unsaturated Compounds

Sections 17.5, 17.6, 17.8, 17.9, 17.11, 17.14, 17.15, 17.16, & 17.17 may be ignored

Chapter 18 – Reactions at the α -Carbon of Carbonyl Compounds

Sections 18.5, 18.7, 18.8, 18.21, & 18.22 may be ignored

Chapter 19 – Reactions of Benzene & Substituted Benzenes

Sections 19.10, 19.11, 19.17, 19.18, 19.20, 19.21, 19.22, 19.23, 19.24, & 19.25 may be ignored

Students with Disabilities: Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations MUST be approved through the Access Center. For more information contact a Disability Specialist

Academic Integrity: You are encouraged you to work with classmates on assignments, however, each student must turn in original work. No copying will be accepted. Falsified lab data is also a violation of academic integrity. Students who violate WSU's Standards of Conduct for Students will receive an F as a final grade in this course, will not have the option to withdraw from the course, and will be reported to the Office Student Standards and Accountability. Cheating is defined in the Standards for Student Conduct WAC 504-26-010 (3). It is strongly suggested that you read and understand these definitions. In addition, if during an exam you use an internet connected or other electronic devices, you will fail the exam and be reported as described above.

Safety Statement: Washington State University is committed to enhancing the safety of the students, faculty, staff, and visitors. It is highly recommended that you review the Campus Safety Plan (<http://safetyplan.wsu.edu/>) and visit the Office of Emergency Management web site (<http://oem.wsu.edu/>) for a comprehensive listing of university policies, procedures, statistics, and information related to campus safety, emergency management, and the health and welfare of the campus community.