

# ORGANIC CHEMISTRY II (CHEM 232) – FALL 2016

This syllabus subject to change pending notification verbally in class or via the Moodle or Kenyon email list.

*MWF 8:10-9:00 am, Hayes 109*

## **Prof. Yutan Getzler**

*Office:* Tomsich 308  
*Office hours:* Monday, 11 – 1; Wednesday, 10 am – noon; Thursday, 10 – 11 am  
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**Text:** Vollhardt, K. Peter C.; Schore, Neil E. Organic Chemistry: Structure and Function, 6<sup>th</sup> edition

**Optional:** Schore, Neil E. Study Guide and Solutions Manual for Organic Chemistry, 6<sup>th</sup> edition  
ACS Organic Exam Study Guide (2002 Edition)

**Material:** Molecular Visions Molecular Model Kit

## **Point Distribution:**

4 Preliminary Exams @ 120 points each	480
Final Exam	250
Problem presentation & homework	200
<u>Class participation</u>	70
Total	1000

## **Exam Schedule:**

<u>Exams</u>	<u>Primary Content</u>	<u>Date</u>
Exam I	CHEM 231, Chs. 11 & 12	Fri, Sep 9
Exam II	Chs. 17 & 18	Wed, Oct 5
Exam III	Chs. 19, 20, 23	Fri, Nov 11
Exam IV	Cumulative (ACS Std)	Fri, Dec 2
Final	Cumulative; Chs. 14 – 16, 22	Wed, Dec 14, 1:30 pm

**Academic Honesty:** “Kenyon College is, at the core, an intellectual community of scholars – students and faculty – engaged in the free and open exchange of ideas. Critical to this lively exchange and deep engagement with ideas is the academic integrity of our work, both inside and outside the classroom.” In short, all materials submitted for credit must be your own work ([tinyurl.com/KC-Acad-Integ](http://tinyurl.com/KC-Acad-Integ)). I hold you responsible for ensuring each others’ honesty; if you know of a violation, please relay your concerns to myself or the Dean of Students.

**Goals:** Chemistry 232 is a continued exploration of the wild and wonderful lens organic chemists use to view the world. It also provides a foundation of knowledge for other courses at Kenyon and beyond. By the end of the semester you should be able to read and understand much of the current published original research in organic chemistry. By the end of the semester you should have a better understanding of how the world works.

**Prerequisite:** By far the most important prerequisite for this course is a mind that is both curious and skeptical. Further, this course is acutely dependent upon your working knowledge of Chemistry 231 (first semester) material. Exams will contain Chemistry 231 topics, *i.e.* do not forget the synthesis of alcohols, alkyl halides, etc.

**Attendance:** The material you will be expected to know for this course continuously builds on itself. It is quite easy to get behind if you miss a topic. As stated in the college policy:

“Absences for reasons of illness are not ordinarily excused: only when a student is declared by the College physician to be infirm (in a hospital or at home) will a health report be sent from the Health and Counseling Center to the Dean of Students, giving the days when each patient is judged infirm and recommending that the student’s class absences be excused.”

ONLY the Dean of Students or Dean of Academic Advising (NOT the instructor) may offer Excused Absences. If you miss in-class assignments or exams due to severe illness or emergency, your name must appear on the *Excused Absence List* to make up the work; if not, a failing grade will be given. In the event of an absence, you are responsible for securing any notes, handouts or announcements from the class.

If you choose to participate in varsity athletics, note the college policy on attendance in the *Scheduling Guidelines for Athletic Contests* ([http://documents.kenyon.edu/provost/cas\\_athlet\\_sched.doc](http://documents.kenyon.edu/provost/cas_athlet_sched.doc)). By the end of the first week, notify me of all potential conflicts, which may not exceed 10% of our meeting times (4 classes).

**Studying:** There are many potentially effective strategies for success. Read the text to be covered in class before coming to class. Read it again after class. Utilize the Math and Science Skills Center (<https://cip.kenyon.edu/content/mssc>). Work through the exercises and end-of-chapter problems, not just the assigned ones. Work through them three or four times. Pour libations to the chemical gods. Recopy your notes after each lecture. Make a slide-show of reactions you are trying to learn and play it as your screen-saver. Most importantly, ask question in class and during office hours. I also believe your model kits are essential. Familiarity with three-dimensional structure is a crucial skill for organic chemistry and one often neglected by students.

**In-class problem presentations:** At the start of class, one or two students will be called to the board to present a homework problem. Presentations cannot last beyond 8:13 am (8:16 am if there are two presentations). I will ask one follow-up question. Presentations will be graded based on preparation/accuracy (70%), time (20%) & follow-up (10%). I will cut you off at the end of the time period, which may impact your accuracy. If you are not present, you receive no credit. You have one free pass, which is used if you are absent when your name is called.

**Homework:** Every class, a few randomly selected students may be asked to hand in the homework problems. If you are absent, you will receive no credit for this assignment. As above, you have one free pass.

**Class participation:** I will call on you to answer relevant questions; evaluation is on a 0,  $\checkmark$ -,  $\checkmark$ ,  $\checkmark$ + basis. Asking a question relevant to the intellectual content of the course counts towards your participation grade.

**Exams:** The first four exams will be 100 minutes long, running from 7:20 to 9:00. While the focus of these exams is the material covered since the last exam, you must be familiar with basic concepts (stoichiometry, conformational analysis, etc) from earlier in the semester and prior courses. You may bring a cyclohexane model to each exam, but may not use a calculator or your own scratch paper. The exception to this is the ACS exam where you may only use a writing implement.

**Final exam:** The final will be 180 minutes in length and will consist be cumulative with  $\sim 1/3$  of the material coming *directly* from prior exams.

**email Contact:** I will answer questions *via* email, often quickly. Messages sent after 9 pm, will not be read before morning. When class is in session, I will respond to student email within 24 hours >99% of the time.

**Electronic devices:** Do not use them in class. This policy is not just because I am a grumpy old man who just doesn't understand your generation and your music and, also, get off my lawn. Please see this excellent American Psychological Association site for supporting evidence: [www.apa.org/research/action/multitask.aspx](http://www.apa.org/research/action/multitask.aspx).

**Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990:** If you have a disability requiring accommodation to fully participate in class, identify yourself to Erin Salva, Coordinator of Disability Services (PBX 5145, [salvae@kenyon.edu](mailto:salvae@kenyon.edu)). All information and documentation of disability is confidential. No accommodations will be given in this course without notification from Erin Salva.

Date	Topic	Section in V & S
<b>ALKENES</b>		
F 8/26	Structure & Thermodynamics	11-1 to -3 & -5
M 8/29	Hydrogenation & Electrophilic Add'n	12-1 to -3
W 8/31	Electrophilic Add'n of H <sub>2</sub> O & X <sub>2</sub>	12-4 to -5
F 9/2	General Electrophilic Add'ns, $\pm$ Hg, Hydroboration-Oxidation	12-6 to -8
M 9/5	Cyclopropanation, Epoxidation, Dihydroxylation	12-9 to -11
W 9/7	Ozonolysis, Radical Add'ns, Polymerizations	12-12 to -15
<b>F 9/9</b>	<b>Exam I – covering CHEM 231 + material until 9/7</b>	
<b>ALDEHYDES &amp; KETONES</b>		
M 9/12	Structure, Preparation and Addition Rxns of Aldehydes & Ketones	17-1 to -5
W 9/14	Hydrates, Hemiacetals and Acetals	17-6, 17-7
F 9/16	Acetals & Thioacetals as Protecting Groups / Imines and Enamines	17-8, 17-9
M 9/19	Wolff-Kishner Reduction / Cyanohydrins	17-10, 17-11
W 9/21	The Wittig Rxn / The Baeyer-Villiger Oxidation	17-12, 17-13
F 9/23	Enolates, Keto-Enol Equilibria / Deuterium Exchange / Stereoisomerization	18-1, 18-2
M 9/26	Halogenation & Alkylation of Aldehydes & Ketones	18-3, 18-4
W 9/28	The Aldol Addition Rxn & Condensation / Crossed Aldol Condensation	18-5, 18-6
F 9/30	Intramolecular Aldol Condensation / Conjugate Addition	18-7 to -9
M 10/3	The Michael Addition / The Robinson Annulation	18-10, 18-11
<b>W 10/5</b>	<b>Exam II – covering material until 10/3 – No class 10/7</b>	
<b>CARBOXYLIC ACIDS &amp; THEIR DERIVATIVES</b>		
M 10/10	Structural, Physical & Acid-Base Properties of Carboxylic Acids	19-1 to 19-4
W 10/12	No class	
F 10/14	Ppn of Carboxylic Acids & The Addition-Elimination Mechanism	19-6, 19-7
M 10/17	Ppn of Acyl Halides, Anhydrides, & Esters / The Fischer Esterification	19-8, 19-9
W 10/19	Ppn of Amides, Alcohols, $\alpha$ -Bromocarboxylic Acids / HVZ Rxn	19-10 to -12
F 10/21	Add'n-Elim Rxns, Rxns of Acyl Halides	19-7, 20-1, 20-2
M 10/24	Rxns of Acid Anhydrides & Esters	20-3, 20-4
W 10/26	Ester Rxns & Acetoacetic Ester Synthesis	23-1, 23-2
F 10/28	Malonic Ester Synthesis / Michael Addition / Acyl anion equivalents	23-2, to -4
M 10/31	Rxns of Amides & Nitriles / The Hofmann Rearrangement	20-6 to -8
W 11/2	Lactide Polymerization	On Moodle by 3/20
<b>F 11/4</b>	<b>Exam III – covering material until 11/31</b>	
<b>DIENES &amp; AROMATICS</b>		
M 11/7	Allyls	14-1 to -4
W 11/9	Dienes	14-5 to 14-7
F 11/11	Diels-Alder & Electrocyclic Rxns	14-8, 14-9
M 11/14	Benzene Structure, Resonance Energy, Properties & MO Theory	15-1 to -5
W 11/16	Aromaticity	15-6, 15-7
F 11/18	Electrophilic Aromatic Substitution: Halogenation, Nitration, & Sulfonation	15-8 to -10
M 11/28	Electrophilic Aromatic Substitution: The Friedel-Crafts Rxns	15-11 to -13
W 11/30	Electrophilic Attack on Substituted Benzenes: Control of Regioselectivity	16-1 to -3
<b>F 12/2</b>	<b>Exam IV – ACS Standardized Exam</b>	
M 12/5	Electrophilic Attack on Disubstituted Benzenes	16-4, 16-5
W 12/7	Synthetic Strategies / Electrophilic Attack on Naphthalene & Derivatives	16-6, 22-1
F 12/9	Benzylic Reactivity, NAS, Claisen & Cope Rearrangements	22-2, 22-4, 22-7