

FALL 2014 CHEMISTRY 224-001 ORGANIC CHEMISTRY B

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As a result of the first semester class, are you now reading the ingredient lists on food containers or the inserts included with prescription medicines? Do you have more questions about 'natural' or 'organic products'? Then this class is for you. The goal of this class is to expand your view of organic chemistry so that you can better: recognize organic compounds; identify functional groups; read science related news releases with some critical understanding; rationalize molecular reactivity in this and future classes; be prepared to interpret the structures and infer the reactivity of new molecules that you will be seeing; and read labels. Please continue to view this class as a new language that will provide a basis to understand future classes where you will build on the structural and mechanistic information here presented to more easily understand new ideas e.g. rationalize enzymatic reactivity.

CONTENT: This course continues the functional group approach of Organic A with the study of aromatic, carbonyl, carboxyl, and amine functional groups along with simple polyfunctional molecules such as substituted aromatics, diesters, and enones, as well as carbohydrates, and heterocycles. Lectures will begin with spectroscopy and compound identification (Sections: 11-4,5; 14-11; 20-9,11) and will proceed fairly linearly through the book (see lecture schedule on backside of this sheet). We will cover about 13 chapters in 13+ weeks (38 lectures+3 exams) or about 19 pages of reading and problems per lecture, so plan your study time now. The class esp. the final exam is, of necessity, cumulative. The best plan is study organic every day.

I will be available for questions after lectures, during the discussion sections (Tue afternoon), during posted OFFICE HOURS (MWF 11:30-12:30), and other times, by appointment.

LECTURE: M W F 10:25-11:15 FH-133 DISCUSSION: FH-07; Tue 10:00-10:50 & 1:00-1:50

GRADING:	3 exams	300 pts	57.5 %
	1 final	150 pts	28.7 %
	Homework	72 pts	13.8 %

TEXTBOOKS and MATERIALS:

REQUIRED: ORGANIC CHEMISTRY, L.G. Wade Jr., 8th Ed., Prentice Hall (2013) (ISBN 978-0-321-76841-4)

SUGGESTED:

STUDY GUIDE AND SOLUTIONS MANUAL, Wade & Simek 8th Ed

MOLECULAR MODELS, Prentice-Hall, Freeman (Maruzen), Proteus, etc.

Barron's Orgo Cards: Org. Chem. Review, Wang, Razani, Lee, Wu, Berkowitz (ISBN 0-7641-7503-3)

PROBLEMS: [Organic Chemistry: A Short Course 12 Ed, Hart, Craine, *et al.*, 2007 Houghton Mifflin (See Instructor before.)]

You must work problems in a timely manner. Try to assess the relative difficulty and the topics covered so that you are working problems that accurately reflect the material covered in lecture. I only collect H designated group homework problems, but encourage you to discuss and complete all of the suggested homework. I will be happy to review homework in discussion sections and during office hours.

EXAMINATIONS: Exam I-9/19, Exam II-10/13, Exam III-11/5, FINAL 9 am. Mon Dec 8, 2014, FH-133

NOTES:

1. Organic chemistry is not efficiently self taught, and overnight cramming will probably not produce success. (Note paper by Pamela Thacher, 2007) It is better to quickly read the chapter before lecture so that you improve your comprehension during lecture. After lecture, carefully reread the portion covered in lecture, and then work the assigned problems. Form a study group of 3 or 4 students now to check your answers and promptly hand in the H (homework) designated answers from your group.
2. Your homework problems must be done soon after you cover the material in lecture so that you stay current in class. The night before an exam is not an appropriate time. Homework questions have appeared on exams.
3. I grade on a curve and will give statistics such as the mean, the median, and the standard deviation for each exam. I do not predict cutoffs, but can tell you what the cutoff was for a previous test or class. Makeup exams will not be given.
4. Study time per week, for a C, should include: Lecture/disc 4 h, reading 4 h, homework ~4 h, organizing 1 h. Total ~13 h/wk.
5. Copies of old exams will be available on Sakai before the next exam.
6. Academic Integrity: If you are discovered to be cheating on an exam, a grade of 0 pts will be assigned for that exam and your record will note it. The CAS policy is available at http://www.luc.edu/academics/catalog/undergrad/reg_academicintegrity.shtml
7. During Exams: all pagers; cell phones; smart phones; ipads; etc. must be turned off and left in backpacks at the front of the class.
8. Sign-ups for group tutoring at the LSC Tutoring Center (SUL-245 X83194) can be done now via the website www.luc.edu/tutoring with group tutoring starting as soon as you express interest. Orgo study hall starts Monday 25, Aug.
9. There are a number of websites that may be useful. After you have read the text and answered all the problems, ...

MAGAZINES, WEBSITES, & BLOGS THAT HAVE RELEVANT ARTICLES RELATED TO ORGANIC CHEMISTRY:

Consumer Reports, Discover, Scientific American, Science News, Science, Have you read about: artificial sweeteners; Biodiesel; Cr(VI); Food Dyes; Ethanol fuel; nanostructures; steroids; antioxidants; medicinal herbs; NSAIDS; prodrugs; etc.?

DATE	CHAP (Wade 8 th Ed)	224 Proposed LECTURE Schedule LU Fall 2014
8/25	12	Intro: MS; IR Summary pg 553
8/27	13	PMR & CMR Summary pg 597
8/29	15	UV-Vis & Structure Problem solving. Summary pg 613
9/1		Labor Day - No Class
9/3	14/15	Ethers- Dienes, MO Theory, allylic ions, 1,2 vs 1,4 additions, allylic radicals, Diels-Alder Reaction
9/5	16	Benzene, MOs, Huckel's Rule, Aromatic ions, Heterocycles, Polycyclics,
9/8	16	Benzene derivatives & Nomenclature, Physical Properties, Spectroscopy
9/10	17	Electrophilic Aromatic Substitution Rxns. (S _E 2) Halogenation, Nitration, Sulfonation, & Friedel-Crafts
9/12	17	Reaction on monosubstituted benzenes: directing & activating effects; on polysubstituted benzenes
9/15	17	Benzyne mech., Nucleophilic Ar Substitution (S _N Ar), Addition rxns. to benzenes, side chain rxns.
9/17	18	Aldehydes & Ketones - Structure, Properties, Nomenclature, Spectroscopy, industrial importance Exam1
9/19		EXAM I (Fri)
9/22	18	Syntheses of aldehydes & ketones: Review of old and intro. to new reactions
9/24	18	Nucleophilic Additions (A _N) with carbon nucleophiles and oxygen nucleophiles (hydrates, acetals, etc.)
9/26	18	Nucleophilic Additions (A _N) with nitrogen nucleophiles (hemiaminals, imines, enamines)
9/29	18	Reductions, aldehyde oxidations, protecting groups
10/1	19	Amines – Structure, nomenclature, properties (incl. acid-base), spectroscopy,
10/3	19	Amine Reactions: rev. (Imine formation,; Hetero S _N Ar); Alkylation, acylation, sulfonation,
10/6-7		Fall Break No Classes
10/8	19	Amine Rxns: Hoffmann Elim; Cope Elim (oxidn.); Nitrous Acid(diazotization), diazonium salt rxns;
10/10	20	Carboxylic Acids – structure, nomenclature, properties, spectroscopy, and syntheses
10/13	20	Exam 2 (Mon) & Columbus Day
10/15	20	Reactions: Acid-base(salts); esterifications; acid halides to esters & amides; reductions; alkylations
10/17	21	Carboxylic acid derivatives- nomenclature, properties, spectroscopy, gen. rxn. mechanisms (A _{AC} 2)
10/20	21	Reactions of acid derivatives: reductions and reactions. with organometallics
10/22	21	Rxns of acid halides, anhydrides, esters
10/24	21	Rxns of amides, nitriles Carbonic acid derivatives
10/27	22	Enols & enolates, α substitution (Alkylation with enolates & enamines), Aldol Cond. mech w dehydration
10/29	22	Aldol cyclizs. w dehydration, Claisen ester cond. Crossed claisen cond., Malonic and Acetoacetic ester Synth.
10/31	22	Conjugate Additions (Michael Rxn.) Robinson Annulations (Michael Rxn. followed by aldol cyclization)
11/3	23	Synthesis overview. Carbohydrate introduction – representations, classifications and nomenclature
11/5		Exam3 (Wed)
11/7	23	Cyclic (Haworth vs chair) structures, anomers, mutarotation, redox in monosaccharides, side reactions in base
11/10	23	Nonreducing sugars, glycosides, ethers and esters, osazones from phenylhydrazine rxns, Ruff degradation
11/12	23	Kiliani-Fischer chain extension Fischer proof of glucose str. Periodic Acid cleavage & Ring size detm.
11/14	23	Dissaccharides & polysaccharides Nucleic acid structure intro Ethics in scientific research.
11/17	24	Nomenclature, representations, structure, and properties of amino acids
11/19	24	Structure and Nomenclature of peptides & proteins - Structure Dets. -
11/21	24	Solution & solid phase syntheses
11/24	25	Lipids: structures; nomenclature; properties
11/26-30		Thanksgiving Break - No Classes (Thur-Sun)
12/1	25	Lipids
12/3	26	Intro to polymers & plastics
12/5		Last class: Catchup or review
12/8		Monday, FINAL EXAM 9-11am FH-133

SUGGESTED HOMEWORK FROM "ORGANIC CHEMISTRY" by Wade L. G. (8th Edition)

(The more problems you work, the better should be your understanding of a topic)

CHAP PROBLEMS

12.	12- 20, 26, H= 29.	20. 1-21,24-45,H=43&44
13.	25-49, H=47.	21. 1-60, H=51-53
15.	4-16, 18,23-27,H=31.	22. 1-47, 50,51,56,59-65,67-70 H=71
16.	3,4,7,8,12-29, H=32, 38	23. 1-14,21-35,47-50,52-55, H=61
17.	1,2,4-34,38,40, 42-48, 50-59, H=58	24. 1-6, 20, 23, 32, H=33
18.	1-34,37-44,46-65, H=66	25. 1-17, 25, H=26
19.	1-10, 16-51, H=51 & 52	26. 17, 21, (FYI) 22-30

38 meetings+3 exams