SPRING 2011 CHEMISTRY 224-011 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 diesters, enones, and substituted aromatics 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 (36 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 (Wed and Fri 11:30), during posted OFFICE HOURS (MWF 10:10-11:15), and other times, by appointment.

LECTURE: M W F 9:20-10:10 FH-133 **DISCUSSION**: Dumbach 235; W&F 11:30-12:20

GRADING:		
	3 exams	300 pts 60 %
	1 final	150 pts 30 %
	Homework	50 pts 10 %

TEXTBOOKS and MATERIALS:
REQUIRED: **ORGANIC CHEMISTRY**, L.G. Wade Jr., 7th Ed., Prentice Hall (2009) (ISBN 0-13-147871-0)
SUGGESTED:
STUDY GUIDE AND SOLUTIONS MANUAL, Wade & Simek 7th Ed
MOLECULAR MODELS, Prentice-Hall, Freeman (Maruzen), or Proteus.
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 collect only designated group homework problems, but encourage you to discuss and complete all of the assigned homework. I will be happy to review homework in discussion sections and during office hours.

EXAMINATIONS: Exam I-2/11, Exam II-3/22, Exam III-4/16, FINAL 1 pm. Sat May 2, 2011, FH-133
NOTES:
1. Organic chemistry is not efficiently self taught, and overnight cramming will probably not produce success. (Note recent paper by Thacher.) It is better to quickly read the chapter before lecture so that you improve your comprehension during lecture. After lecture, carefully reread the chapter or portion covered in lecture, and then work the assigned problems.
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 ~3 h, organizing 1 h. Total ~12 h/wk.
5. Copies of old exams will be available on Blackboard 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; ipods;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 Fri. Jan. 21.
MAGAZINES, WEBSITES, & BLOGS THAT HAVE RELEVANT ARTICLES RELATED TO ORGANIC CHEMISTRY: *Discover, Scientific American, Consumer Reports, Science News, Science, Have you read about: steroids: Biodiesel; Food Dyes; artificial sweeteners; nanostructures; antioxidants; Cr(VI); Ethanol fuel; medicinal herbs; NSAIDS; prodrugs; etc.?*

DATE CHAP (Wade 7th Ed) 224 Proposed LECTURE Schedule LU Spring 2011

1/19	12	Intro: MS; IR
1/21	13	PMR & CMR
1/24	15	UV-Vis Structure Problem solving
1/26	14/15	Ethers- Dienes, MO Theory, allylic ions, 1,2 vs 1,4 additions, allylic radicals, Diels-Alder Reaction
1/28	16	Benzene, MOs, Huckel's Rule, Aromatic ions, Heterocycles, Polycyclics,
1/31	16	Benzene derivatives & Nomenclature, Physical Properties, Spectroscopy
2/2	17	Electrophilic Aromatic Substution Rxns. (S_E2) Halogenation, Nitration, Sulfonation, & Friedel-Crafts
2/4	17	Reaction on monosubstituted benzenes: directing & activating effects; on polysubstituted benzenes
2/7	17	Benzyne mech., Nucleophilic Ar Substitution (S_NAr), Addition rxns. to benzenes, side chain rxns.
2/9	18	Aldehydes & Ketones - Structure, Properties, Nomenclature, Spectroscopy, industrial importance Exam1
2/11		**EXAM I (Fri)**
2/14	18	Syntheses of aldehydes & ketones: Review of old and intro. to new reactions
2/16	18	Nucleophilic Additions (A_N) with carbon nucleophiles and oxygen nucleophiles (hydrates, acetals, etc.)
2/18	18	Nucleophilic Additions (A_N) with nitrogen nucleophiles (hemiaminals, imines, enamines)
2/21	18	Reductions, aldehyde oxidations, protecting groups
2/23	19	Amines – Structure, nomenclature, properties (incl. acid-base), spectroscopy,
2/25	19	Amine Reactions: rev. (Imine formation,; Hetero S_NAr); Alkylation, acylation, sulfonation,
2/28	19	Amine Rxns: Hoffmann Elim; Cope Elim (oxidn).; Nitrous Acid(diazotization), diazonium salt rxns;
3/2	20	Carboxylic Acids – structure, nomenclature, properties, spectroscopy, and syntheses
3/4	20	**Exam 2 (Fri)**
3/5-13		**SPRING BREAK NO CLASSES**
3/14	20	Reactions: Acid-base(salts); esterifications; acid halides to esters & amides; reductions; alkylations
3/16	21	Carboxylic acid derivatives- nomenclature, properties, spectroscopy, gen. rxn. mechanisms ($A_{AC}2$)
3/18	21	Reactions of acid derivatives: reductions and reactions. with organometallics
3/21	21	Rxns of acid halides, anhydrides, esters
3/23	21	Rxns of amides, nitriles Carbonic acid derivatives
3/25	22	Enols & enolates, α substitution (Alkylation with enolates & enamines), Aldol Cond. mech w dehydration
3/28*	22	Aldol cyclizs. w dehydration, Claisen ester cond. Crossed claisen cond., Malonic and Acetoacetic ester Synths.
3/30*	22	**Exam3 (Wed)**
4/1	23	Conjugate Additions (Michael Rxn.) Robinson Annulations (Michael Rxn. followed by aldol cyclization)
4/4	23	Synthesis overview. Carbohydrate introduction – representations, classifications and nomenclature
4/6	23	Cyclic (Haworth vs chair) structures, anomers, mutarotation, redox in monosaccharides, side reactions in base
4/8	23	Nonreducing sugars, glycosides, ethers and esters - Phenylhydrazine rxns. to form osazones, Ruff degradation
4/11	23	Kiliani-Fischer chain extension Fischer proof of glucose str. Periodic Acid cleavage & Ring size detm.
4/13	23	Dissacharides & polysaccharides Nucleic acid structure intro
4/15	24	Nomenclature, representations, structure, and properties of amino acids
4/18	24	Structure and Nomenclature of peptides & proteins - Structure Dets. -
4/20	24	Solution & solid phase syntheses
4/21-25		**Easter Break - No Classes** (Thur-Mon)
4/27	25	Lipids: structures; nomenclature; properties
4/29	26	Intro to polymers & plastics or Review; Last Class Day!
5/7		Saturday, FINAL EXAM 1-3 pm FH-133

SUGGESTED HOMEWORK FROM "ORGANIC CHEMISTRY" by Wade L. G. (7th Edition)

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

CHAP	PROBLEMS	
12.	12- 20, H= 25.	20. 1-17,19-33,35-40,H=45&47
13.	25-45, H=47&48.	21. 1-36,39,43-48, H=50, 51-53
15.	4-16, 18,23-27,H=30.	22. 1-47, 50,51,56,59-65,67-71
16.	3,4,7,8,12-29, H=32	23. 1-14,21-35,47-50,52-55, H=63
17.	1,2,4-32,38,40, 43-52, H=60	24. 1-6, 20, 23, 32, H=33
18.	1-4,6-14,16-31, 34,38-40, 43,44,47 H=51	25. 1-17, 25, H=26
19.	1-21,24,26,27,29-39H=41,44,47	26. 21, (FYI) 22-29

37 meetings+3 exams