FALL 2009 CHEMISTRY 223-013 ORGANIC CHEMISTRY A

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Do you read the ingredient lists on food containers or the inserts included with prescription medicines? Do you have questions about 'natural' or 'organic products'? If so, this could be the class for you! The **goal** of this class is to introduce you to the world of organic chemistry so that you can: read labels; 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 molecules to which you will be introduced; and, OH YES, pass future exams that depend on this information. You might think of this as a new language that will provide a basis to understand future classes by allowing you to build on the structural and mechanistic information here presented *e.g.* rationalize enzymatic reactivity or interpret drug structures.

CONTENT: This course is a functional group approach to organic chemistry in which the fundamentals of aliphatic and alkenic chemistry will be discussed along with bonding, nomenclature, stereochemistry, conformational analysis, reaction mechanisms, and spectroscopy. The tentative lecture and exam sequence is listed. I plan to cover 14.5 chapters in roughly 13.6 weeks with about 50 pages of reading per week. The first two chapters are a review of topics from General Chemistry. Your previous textbook may help you review this material. 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 11:30-2:45), during posted OFFICE HOURS (MWF 10:20 am), and other times, usually by appointment.

LECTURE: M W F 9:20-10:10 DH-236 **DISCUSSION**:W 11:30 & 12:35-1:25 DH-733

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

TEXTBOOKS and MATERIALS:

REQUIRED: **ORGANIC CHEMISTRY**, L.G. Wade Jr., 7th Ed., Prentice Hall (2010) You may also use the 5th or 6th Eds.
SUGGESTED: ^ ISBN-13:978-0-32-159231-6 (Be certain you have the appropriate Study Guide.)

STUDY GUIDE AND SOLUTIONS MANUAL, Wade & Simek 7th Ed or 6th or 5th Ed.

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

Pushing Electrons: A Guide for students of Organic Chem., D.Weeks, HarBrace

Organic Chemistry as a Second Language, D. Klein, J. Wiley (2004) ISBN 0-471-27235-3 OR

Organic Chemistry I as a Second Language John Wiley (2007) - PBK- 363 pages - ISBN 0470129298

PROBLEMS: 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 do and discuss all of the assigned homework. I will be happy to review homework in discussion section and during office hours.

EXAMINATIONS: Exam I-9/18, Exam II-10/14, Exam III-11/9, FINAL Saturday Dec 12, 2009 1 pm FH-133

NOTES:

1. Organic chemistry is not efficiently self taught; overnight cramming *will not* produce consistent success. It is better to quickly scan the chapter before lecture so that your lecture comprehension is improved. After lecture, carefully read the chapter or portion covered in lecture, and then work the assigned problems.
2. 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 to start homework. 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/ week for a C should include: Lecture/disc 4hr, reading 4 hr, homework 1-2 hrs, organizing 1 hr. Total 10-11 hr/wk.
5. Copies of an old exam will be made available on Blackboard.
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 the Dean of A&S will be informed. Other consequences may follow. The Undergraduate Handbook discusses Loyola Policies.
7. All pagers and cell phones must be turned off during exams and all books, bags, coats, *etc.* brought to the front of the room!
8. LSC Tutoring Center (SUL-245 X83194) walk-in assistance first two weeks with appointments starting the first wk. of Sept. Their schedule has been: M-F 10:00am till 6 M, 8Tu-W-Th, and 2 pm Fri. www.luc.edu/tutoringcenter

MAGAZINES THAT HAVE ARTICLES RELEVANT TO ORGANIC CHEMISTRY: *Discover, Scientific American, Consumer Reports, Science News, Science, etc.* Have you read articles in the newspapers about sweeteners, traces of drugs in city water, etc.?

DATE	CHAP (Wade 7th Ed)	223 Proposed LECTURE SYLLABUS LU FALL 2009 (Tentative)
8/24	1	Intro: Lewis Structures, Bonding, bond polarity, charges, ionic strs., resonance, Molecular & Empirical formulas
8/26	1	Representations of molecules, models, Modeling, Acid-Base defs., Rel. Strengths(pg 1261), Nomenclature intro
8/28	2	MO Theory & bonding, hybridization -electron densities, Bond rotation, isomerism, Bond &molecular polarities
8/31	2	Solubilities, intermolecular forces (VanderWaals) hydrocarbons, O & N containing cpds,, funct. gps.
9/2	3	Alkanes-Nomenclature, properties, sources, reactions, bond rotations, and conformations
9/4	3	Cycloalkanes (as above + ring strain), Stereochemistry: definitions, isomers, & representations
9/7		**Labor Day - Holiday**
9/9	3	Bicyclics, nomenclature, drawing, use of models,
9/11	4	Free radical halogenation, chain reactions, bond dissoc. energies, K, ΔG, ΔH, ΔS
9/14	4	Kinetics, E_a or ΔG^+, kinetic rates (k) depend on T, [SM], and [catalysts], if needed. Hammond Postulate
9/16	4/5	Reactive intermediates. Chirality: definitions- R & S, racemic, ee, opt. purity, chiral cpds wo chiral centers
9/18		**EXAM I**
9/21	5	Representations (Fischer, models, etc), diastereomers, Multiple centers, Rev. Isomer defs., Resolution
9/23	6	Alkyl Halides: structure, nomenclature, properties, preps.
9/25	6	Halide Reactions: Substitution and Elimination, S_n2 reactions, mechanism- nucleophilicity, solvent, substrate
9/28	6	S_n1 reactions, mechanism, stereochemistry, structure, solvent, rearrangements, Comparison: S_n1 vs S_n2
9/30	6	Eliminations: E_1 (carbocation mech.) vs E_2 (concerted mech., stereochemistry)
10/2	7	Alkenes: MO description, index of H deficiencies, Nomenclature, isomers, stabilities, and properties
10/2-6		**Midterm Break**
10/7	7	Alkenes: Synthesis - Eliminations & dehydrations Industrial syntheses. Mechanistic Problem solving strategies
10/9	8	Alkene Reactions: Addition Reactions (HX, H_3O+, BH_3-THF, H_2/cat, halogen, HOCX, carbene, epoxidation)
10/12	8	Alkene Reactions: epoxy opening, oxidative cleavage, syn-hydroxylation, and polymerization
10/14		**EXAM II**
10/16	9	Alkynes: Nomenclature, Props, MOs, acidity, syntheses via substitution & elimination
10/19	9	Alkyne Reactions: Additions, oxidations, and multistep syntheses using alkynes
10/21	9	Alkene & Alkyne Reaction summary:
10/23	10	Alcohols: Structure, nomenclature, classification, properties, acidity (phenols), commercial importance
10/26	10	Syntheses: previous and addition of organometallic reagents to C=O cpds.
10/28	10	Reductions of C=O cpds, Thiols (RSH): nomenclature, analogies to and differences from ROH.
10/30	11	Alcohol Reactions: oxidations, nucleophiles with acid halides (RSO_2Cl, HOCl, $SOCl_2$, PCl_3, etc.)
11/2	11	Alcohol Rxns: dehydrations, esterification with RCO_2H, inorganic esters **Drop Day**
11/4	11	Reactions of alkoxides & General Synthetic Approaches
11/6	12	Spectroscopy: Introduction and Infrared Spectroscopy (IR)
11/9		**EXAM III**
11/11	12	Mass Spectrometry (MS)
11/13	13	Proton Nuclear Magnetic Resonance: NMR Introduction vs MRI, Chemical Shift~e- densities, Integration
11/16	13	PMR: Splitting patterns or Proton Coupling. Intro. to interpretation.
11/18	13	Carbon NMR (CMR): Intro., Chemical shift effects, carbon counting. Intro to interpretation
11/20	15	Ultraviolet (UV)/Visible (VIS) Spectroscopy: Conjugation and functional groups indicated
11/23		Solving Spectroscopic Problems using all spectroscopic tools
11/25-29		**Thanksgiving Break**
11/30	14	Ethers: Nomenclature, properties, spectroscopy, syntheses (Williamson, from ROH, etc.)
12/2	14	Ether Reactions: Cleavage by HX, autoxidation. Sulfides [RSR']
12/4	14	Epoxides: Syntheses and Reactions (Acid cat. , Base cat., RM Openings), epoxy resins
12/11		Afternoon Review (12-2) session could be available, if desired.
12/12		**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 you should understand the topic.)

CHAP	PROBLEMS		
1.	1-11, 14-32, 34-38, 40-52	Homework assign. 45 predict direction of rxn.	
2.	All except #12.	Hmwrk 44.	**8.** 1-50, 51-62
3.	1-44,	Hmwrk. 44.	**9.** 1-34,35-39.
4.	All except 5,6,16,17,20, & after49	Hmwrk. 46.	**10.** 1-40, 41-44,
5.	1-11, 14-31,	Hmwrk. 30.	**11.** 1-50, 51-60.
6.	1- 56, 60 & 61	Hmwrk. 56	**12.** 2-12, 14-25, 26- 29.
7.	1-46,	Hmwork 46	**13.** 2-44, 46-52, 53. **14.** 1-19, 21-33, 34-41.