Syllabus for Organic Chemistry I
Chemistry 221, Section 001
4.0 Semester Hours
Fall Semester, 2010

Lectures: M, W, F --- 2:45 - 3:35 p.m., FH-7

Discussion Section: T --- 1:00 - 2:15 p.m., FH-7

Instructor: Dr. Babler (Office: FH-209-210)
e-mail: jbabler@luc.edu

Office Hours: M --- 2:00 – 2:30, 3:45 – 5:00 p.m.
W --- 3:45 – 5:00 p.m.
F --- 2:00 – 2:30, 4:00 – 5:00 p.m.

Other times by appointment, please.

Prerequisites: Chemistry 106 or its equivalent (Chemistry 102 and 112).

Content: This course is the first semester of a comprehensive and somewhat rigorous survey of organic chemistry. The topics include: structure and bonding in organic molecules; alkanes; alicyclic compounds; stereochemistry and conformational analysis; alkyl halides; alcohols and ethers; an introduction to infrared and nuclear magnetic resonance spectroscopy and mass spectrometry in organic chemistry; alkenes; and alkynes.

Learning Outcomes: Students will develop an understanding of the chemical behavior of relatively simple organic molecules and the mechanisms by which such reactions occur. Students will also be introduced to the use of spectroscopy as a powerful tool for structure determination of organic molecules.

Assignments: Students are strongly advised to read the assigned pages in Vollhardt's and Schore's textbook and to work some of the suggested problems (listed on the attached sheet). However, there will be no formal homework assignments!

Attendance at the scheduled discussion section is strongly recommended, but not required. The instructor will generally use the time allotted for discussion section to answer students' questions and to work some of the recommended problems from the textbook.

NOTE: Even though attendance at the discussion section is optional, those weekly sessions are a valuable part of the course since they offer the students an opportunity to ask questions and/or request that certain topics be clarified or explained in greater detail. Due to the vast number of topics that an organic instructor is required to cover during the formal course lectures, little (if any) time is available to answer students' questions during the lecture section. If you do have an urgent question that arises during the lecture and you prefer not to wait until the next discussion section, feel free to ask such questions at the end of the lecture section.

Unless you are excused by the instructor (i.e., you are repeating the course and have previously completed the lab work), students are required to perform the lab experiments and take the exams that are required for students registered for CHEM 225 (Organic Chemistry Lab A). You will do these experiments on Tuesday afternoons (2:30 -5:15 p.m.). You will not be required to attend lab on Thursday afternoons during the first several weeks of the semester --- i.e., until the formal course lectures have covered introductory topics such as structure and bonding in organic molecules, as well as nomenclature of rather simple organic structures. After that time, the Thursday afternoon (2:30 -5:15 p.m.) lab session will be used for various additional assignments. On Thursday, Sept. 16th, you will be introduced to "chemical literature searching online." You will receive training on the use of SciFinder Scholar [which provides desktop access to several databases from Chemical Abstracts Service (CAS)] and will also cover basics of "Web of Science." Additional Thursday afternoon assignments include the following: molecular modeling: conformational analysis of cyclohexane derivatives; isolation of a "terpene" from orange peels by steam distillation; characterization of the "terpene" isolated from the previous experiment by recording its IR spectrum, as well as using a polarimeter to measure its specific rotation; use of column chromatography to purify a non-polar organic compound (fluorene) contaminated with a polar compound (fluorenone); dehydration of an alcohol: preparation of cyclohexene; and hypochlorite oxidation of a secondary alcohol. As soon as the Tuesday afternoon laboratory work involves "preparative experiments," the Thursday lab session will be used to characterize (e.g., IR, NMR, TLC) organic compounds you have prepared during experiments conducted on Tuesday afternoons.

NOTE: You do not have to register for CHEM 225; by registering for CHEM 221, you were automatically enrolled in the Tuesday afternoon lab section. Your grade for the lab work will be incorporated into your final grade for CHEM 221 (i.e., you will not receive a separate grade for lab work on your report card). Failure to complete this lab work will result in a grade of "I" for CHEM 221. This grade will subsequently be changed to "F" on your transcript unless arrangements can be made for you to complete the experimental work within six weeks of the end of the semester. Permission for students to conduct "make-up" experiments will be granted only for very serious reasons -- e.g., if a student has been hospitalized.

Grading: Three hour exams will be given during the semester, as well as a final examination.

Distribution of points:

Hour Exam I:	125
Hour Exam II:	140
Hour Exam III:	175
Lab Experiments and Exams:	210
Lecture Final Exam:	250
Total:	900 points

Grading Scale: Exams (excluding lab exams):
A = 550-690; B+ = 510-549; B = 440-509; B- = 400-439;
C+ = 340-399; C = 280-339; C- = 230-279; D+ = 185-229; D = 140-184;
F = 0-139 points.

Laboratory work: A separate grading scale is used for lab work and will be announced by the lab coordinator for CHEM 225. Your lab grade will be adjusted prior to being incorporated into your final grade for CHEM 221. For example, if your lab grade is 90%, you will receive 189 points (90% x 210) as part of your final grade in CHEM 221.

NOTE: There is no penalty if a student misses an hour exam; instead his/her final exam score will be used to determine a larger % of the final grade. For example, if one misses the first hour exam, his/her final examination score would represent 41.7% (i.e., 375 points) of the final grade. No "make-up" hour exams will be administered, unless your absence is due to your required participation in a University-sanctioned event.

WARNING: Since you are allowed to use an 8.5 x 11" sheet of notes as an aid during the final exam for the lecture section of this course, some of you may be tempted to skip the other tests. Despite the availability of such notes during the final exam, it usually proves to be quite difficult; and therefore you should miss an exam only in case of serious illness and the like!

Hour exam I will be given on Friday, September 24; hour exam II will be administered on Friday, October 22; and the third hour exam is scheduled for Friday, December 3. The final exam for this course (lecture section only) is to be given on Friday, December 17, 1:00 p.m. – 3:00 p.m. in FH-7.

NOTE: The Chemistry Department administers make-up final exams (different from the regular final exam) to those students who have a legitimate excuse (e.g., death in the immediate family; serious illness -- which does not include organophobia!; a court appointment that cannot be rescheduled, etc.). If for one of the latter reasons you are unable to take the regularly scheduled final exam, please inform the instructor (e-mail: jbabler@luc.edu) promptly --- but no later than 48 hours after the date of the final exam --- so that a final grade of "I" can be assigned to you.

NOTE: A grade of "I" will not be assigned to you unless you can verify that there was a valid reason for your missing the final exam (e.g., hospitalization or death in the immediate family). Even if your final grade is an "I," you are still required to take a "make-up" final exam or the "I" will be converted to an "F" by the Dean's office.

NOTE: Oversleeping, forgetting what day it is, etc. are not valid excuses for missing the final exam. The Chemistry Dept. will not accept such explanations from students, and a grade of "0" will be assigned for your final exam score!

The last day to withdraw from class with a grade of "W" is Friday, November 5. After that date, the Dean's office will automatically assign the grade of "WF" when a student withdraws from the course (except for cases in which the student is hospitalized or encounters some very serious difficulty.) **NOTE**: In regard to advice concerning a decision to withdraw (or not) from CHEM

221, each student will meet briefly with the instructor sometime during the week of October 25-29 to discuss his/her progress in the course. If you have taken neither of the two tests given in the course at this stage of the semester, you are strongly advised to withdraw from the class.

Textbooks:

Laboratory: In order to conduct the Tuesday afternoon lab experiments, you should purchase the same paperback used by the students registered for CHEM 225 --- "Catalyst Lab Manual."

To assist you in characterizing the organic compounds you prepare in lab, you may also want to purchase a copy of the following paperback: "Introduction to Organic Spectroscopy" (Oxford Chemistry Primers, No. 43), by L.M. Harwood, T.D.W. Claridge, and D.W. Claridge (Oxford University Press, 1997).

Lecture: Organic Chemistry: Structure and Function, Sixth Edition, by Vollhardt and Schore.

Recommended: A copy of the study guide and solutions manual for Vollhardt's and Schore's textbook (available at the bookstore).

Required: Darling Models, Kit #1A (See: www.molecularvisions.com) or a similar molecular models kit (available at the bookstore).

NOTE: As a possible study aid, you may want to consider use of the following: A **QuickFacts Study Card** is included with every copy of the Vollhardt/Schore text --- located at the back of the book on blue paper. With page references included for easier studying, this helpful resource should be more useful than "flash cards" or unrelated study tools.

Another possible study aid is a paperback by D. R. Klein entitled "Organic Chemistry as a Second Language: Translating the Basic Concepts" (published in 2004 by John Wiley & Sons, Inc.; ISBN 0-471-27235-3; www.wiley.com/college/klein). The goals of the latter book are to help the student to develop the skills required to solve a variety of problem types in organic chemistry and to point out the fundamental principles in organic chemistry.

An additional study aid is a paperback by D.P. Weeks entitled "Pushing Electrons: A Guide for Students of Organic Chemistry," Third Edition (Thomson Brooks/Cole); ISBN 0-03-020693-6. The first 3 chapters (pp. 1-161) of this workbook are intended to help a student understand "structure and bonding in organic molecules," as well as techniques of "electron pushing" so as to comprehend reaction mechanisms.

Supplementary Textbooks:

Organic Chemistry, Tenth Edition, by T.W.G. Solomons and C. Fryhle (John Wiley & Sons, 2011).

Organic Chemistry, by J. McMurry, Seventh Edition (Brooks/Cole Publishing Co., 2008).

Organic Chemistry, by F. A. Carey and R. M. Giuliano, Eighth Edition (McGraw-Hill, Inc., 2011).

Organic Chemistry, by L.G. Wade, Jr., Seventh Edition (Pearson Prentice Hall, 2010).

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Suggested Readings and Problems in *Organic Chemistry: Structure and Function* (6th Edition by K.P.C. Vollhardt and N.E. Schore)

I. Introduction to Organic Chemistry; Bonding in Organic Molecules

Read: pp. 1-44
Problems: p. 22: #1-11; p. 36: #1-16; p. 39: #1-21; pp. 44-48: #25b,g,h; 28b,c; 31a,b,g; 38; 41; 45; 46c; 49a,b; 51a,b,d,e,g; 54; 55; 57

II. Alkanes

Read: p. 49 – top of p. 55, pp. 67 (Section 2-3) – 89, 95-124
NOTE: Acid and base theory (Section 2-2) will be discussed later in the semester.
Problems: p. 72: #2-17, p. 73: #2-18; pp. 90-94: #33a,b,c,f; 35a,b,d,e,f,j; 36b,d; 39c,d; 40c,d,f; 42b,d; 46; 52; 53; 55; p. 114: #3-9; pp. 127-130: #15c,d; 16c; 21a,b; 27c,d,e; 33b,c; 46; 47; 48

III. Cycloalkanes

Read: pp. 131-161
Problems: p. 134: #4-3; p. 148: #4-11; p. 153: #4-16; pp. 162-168: #23b,d,e; 30; 32c,d; 42; 49a,b; 55; 56; 57

IV. Stereochemistry

Read: pp. 169-207
Problems: p. 174: #5-5; p. 177: #5-8; p. 181: #5-9b,d; p. 189: #5-19; p. 191: #5-20; pp. 208-214: #32; 33; 36; 39; 40c; 43; 45c; 48; 53; 54; 55a,b,c,g; 59; 67; 69; 70

V. Alkyl Halides

Read: pp. 65-66 (the Section on "Electrophiles and Nucleophiles"); pp. 215-245, 251-277
Problems: p. 220: #6-1; p. 221: #6-3; p. 227: #6-12a; p. 229: #6-15; p. 232: #6-18; p. 234: #6-22; p. 238: #6-24; pp. 247-250: #41; 42a,c; 44; 45; 46c,d; 47b,f; 48d,e,h; 53e; 56; 57; 65; 66; p. 252: #7-1; p. 266: #7-10; pp. 269-270: #7-14; 7-15; p. 273: #7-16; pp. 278-286: #25; 27; 30; 31; 32; 35; 40d; 46; 49a,c,h,i; 50d,e; 59; 60; 62; 63; 64; 66

VI. Alcohols

Read: pp. 56-63 (Section 2-2); pp. 287-325, 333-347
Problems: p. 293: #8-4; p. 300: #8-9; p. 309: #8-15; 8-16b; pp. 326-332: #24d,f,g; 36b,c,e; 38; 40a,c,d; 43b,d; 46b,c; 48b; 50; 53b,c; 54; 57; 65; p. 338: #9-3; p. 347: #9-10; pp. 377-386: #29; 31d,g,h; 36c; 38a-d,j-m; 61; 66b; 76; 77

VII. Ethers

Read: pp. 347 (Section 9-5) – 364
Problems: p. 352: #9-12; p. 358: #9-19; p. 362: #9-23; p. 364: #9-24; pp. 379-386: #41a,b; 44; 49; 54f,g; 75; 78

VIII. Infrared and Nuclear Magnetic Resonance Spectroscopy and Mass Spectrometry in Organic Chemistry

Read: pp. 468-472 (Section 11-8); pp. 387-426; pp. 453-458 (Section 11-4); pp. 473-477 (Section 11-9)
Problems: p. 397: #10-3; p. 401: #10-7; p. 412: #10-12d; p. 420: #10-16; p. 424: #10-18; p. 426: #10-19a,b; pp. 436-444: #26a,c; 32; 34; 36h,i,j; 38; 39; 43; 47; 58a; 64; 65; 66; p. 483: #11-25; pp. 493-495: #52; 54; 63

IX. Alkenes

Read: pp. 445-453; pp. 459 (Section 11-5) – 467; pp. 507-530; pp. 532 (Section 12-10) – 545; pp. 609-614; pp. 617-625 (Section 14-5 and Section 14-6); pp. 628-638 (Section 14-8)
Problems: p. 448: #11-3; pp. 488-498: #30c,g,i; 39; 49; 50; 72; 73; 74; p. 515: #12-6; p. 523: #12-14; p. 534: #12-22; p. 539: #12-26; pp. 558-566: #37; 42a,c,g; 43; 44a; 46; 58; 59; 63; 64a,c; 66b,d,f; 71; 79; 80; 81; p. 632: #14-18; p. 636: #14-20; p. 663: #53; 58c

X. Alkynes

Read: pp. 567-587, 590-598
Problems: p. 578: #13-9b; p. 583: #13-16; p. 584: #13-18; pp. 599-608: #28c,e; 34; 36a; 38a,b,d,e,f; 41b,c; 44c,d,f,g,h; 49a; 59; 61; 63