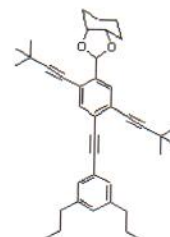


Organic Chemistry I (CHMB41H) - Fall 2009

University of Toronto at Scarborough



Welcome to CHMB41! Organic chemistry is my passion – it's what got me hooked on studying chemistry back when I was in my second year of undergraduate studies. All too often this subject gets a bad rep, but I'm here to tell you that it doesn't have to be so! Organic chemistry is an exciting subject with applications that can be found all around us. Yes, this course is going to require some hard work, but I hope to make it worth your while by exposing you to some of the exciting aspects of this diverse field and connecting the subject to your everyday lives.

Before we get started though, please take a few minutes to read through this document. It contains important information which will help ensure you have all the tools you'll need to succeed in this course.

Staff:

Instructor:

Dr. Effie Sauer

SW506E

Email: esauer@utsc.utoronto.ca

Office Hours: Mon 11:30-1:30, Wed 9:30-10:30, Thurs 2:00-3:00, Fri 9:30-10:30

Lab Coordinators:

Dr. Lana Mikhaylichenko (Until October 23rd)

SW155B

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Office Hours: TBA

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SW155A

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Office Hours: Tues 9:30-11:00, Wed 1:00-2:00, Thurs 9:30-11:00

Email Policy:

Please use a valid "utoronto.ca" account for all CHMB41 correspondence. Emails received from other accounts will not necessarily be answered. When composing your email, please use professional language. Be sure to include the course code in the subject line and sign the email with your first and last name, as well as your student ID. Your email will be answered as soon as possible (likely within 36 hours, unless it is a weekend or holiday).

A note on email content: Please do not email questions regarding the lecture material/assigned reading/suggested problems. These should be posted on the discussion board (see below) so that others can benefit from the responses provided. Questions on the lab material should be directed to one of the lab coordinators, or your TA.

Lecture Schedule:

Monday	8-9 am in AC223
Wednesday	8-9 am in AC223
Friday	8-9 am in AC223

Text:

Organic Chemistry, 5th Ed., by Paula Bruice. The text, study guide, solutions manual and ACE access code can be purchased together from the UTSC Bookstore as a package. Alternatively, you may purchase the text in an unbound, three-hole punched form at a significantly reduced cost. This also has the advantage of allowing you to carry around only those chapters which you are currently using. However, this binder-ready version is not available as a package with the solutions manual, study guide and ACE access code. The ACE access code may be purchased separately from the UTSC Bookstore for \$5. The supplemental books (study guide and solutions manual) can be purchased used either from the bookstore or from former students (often for a very reasonable price). In addition, 10 copies of the solutions manual will be put on reserve in the UTSC library for your reference.

Molecular models:

You are *strongly encouraged* to purchase a molecular model kit from the UTSC bookstore. These will become an invaluable tool as the course progresses since several key topics require visualization and manipulations of compounds in three-dimensions. Note too that you will be allowed to use them as an aid during the mid-term test and final exam.

Website:

CHMB41 maintains a Blackboard web space which archives a variety of course-related information including: class announcements, lecture slides, questions and answers to the weekly homework assignments, contact information and links to some useful outside resources. In addition, class emails will regularly be sent via Blackboard. ***In order for you to receive these emails, you must have a valid "utoronto.ca" email account registered with ROSI.***

To login, go to: <https://portal.utoronto.ca/webapps/portal/frameset.jsp>. Click on "log-in to the portal" at the top left. Login using your UTORid username and password (same as what's used for your UTOEmail). Under the "My Courses" box (top right), click on the CHMB41 link.

Discussion Board:

An online discussion board will be maintained through Blackboard. This online space will provide you with a place to post and answer questions related to the course material. You may post anonymously, or as yourself. The forums will be monitored by myself (and/or a teaching assistant) to ensure that all questions are answered accurately. In addition, frequently asked questions (with their answers) may also be posted here so be sure to check in periodically. ***Please note: Posts which contain answers/solutions to weekly homework assignments are not permitted and will be removed promptly.***

Weekly Homework Assignments:

There will be weekly homework assignments to be completed using the online homework system "ACE" (this program is very similar to the Mastering Chemistry program used in CHMA10/CHMA11). If you purchase a textbook *package* at the UTSC bookstore, your ACE registration code will be included. If you purchase the unbound, three-hole punched version of

the text, or if you acquire a used copy of the text from another source, you will need to purchase an ACE registration code from the UTSC Bookstore.

Instructions for setting up your account can be found with the ACE code package. You will need to enter a course code for this semester's course. This code is: 2571

Problem sets will be released every Friday evening and will be due the following Friday at midnight. The assignments will be equally weighted and the scores will be recorded as a percentage. **Late assignments will not be graded.** In the final calculation for the homework grade, the lowest mark will be dropped.

Term Tests:

There will be two, non-cumulative, 60 minute tests written outside of class time. The exact dates, times, locations and material to be tested will be announced as soon as they are available.

Please note that there will be no make-up exams for a missed test. Should you miss a term test due to a legitimate medical illness, you will need to submit a UTSC medical form (http://www.utsc.utoronto.ca/~registrar/resources/pdf_general/UTSCmedicalcertificate.pdf)

completed by your doctor as soon as possible. Please make sure that your medical note includes the following information:

- Verification that you were examined on the day of the missed test
- The nature of the illness (if possible)
- A statement indicating the physician's professional opinion as to whether you should receive special consideration on medical grounds

With the submission of a valid medical note, the 15% for the term test will be added to your final exam making it worth 55% of your final mark. If you miss both term tests, your final exam will be worth 70% of your grade. Please note that on page 328 of the 2009/2010 UTSC Calendar it states: "You cannot petition to withdraw from a course on the grounds that no work was returned to you before the last day to withdraw without academic penalty if this is the result of your having been given an extension to complete your work for reasons relating to you and not the rest of your class." **If no acceptable medical note is received to validate your absence, you will receive a grade of zero for that test.**

Final Examination:

There will be a 3-hour, **cumulative** exam written during the end of semester exam period. The exact date, time and location will be announced as soon as they are available. **Please note that if you miss the Final Exam, you must petition the Registrar's Office to write a make-up exam in the next formal exam period.** Check the UTSC Calendar for instructions and deadlines.

Labs:

Chemistry is a practical science. You can learn about the theory of a reaction from a textbook, but the techniques required to actually carry out the reaction can really only be learned by doing the experiment yourself. Consequently, the laboratory component of CHMB41 is compulsory, and, **in order to pass the course, you must also pass the lab component.**

Please arrive *on time* for your labs and come *prepared*. The experiments are designed such that a *well-prepared* student can complete the experiment in the allotted time. If you haven't read over the procedure ahead of time and made sure that you understand each step, it will likely be

difficult for you to finish your work on time. As a suggestion, I recommend that you prepare a point-form version of the lab procedure before coming to each lab.

Lab Schedule:

Odd numbered lab sections: Your first lab will be in the week of Sept 14/09

Even numbered lab sections: Your first lab will be in the week of Sept 21/09

Lab Manual: This should be purchased from the UTSC Bookstore. Note, you may not use a lab manual from a previous year as many of the experiments are changed between year.

Lab Coats and Safety Glasses: Lab coats and safety glasses must be worn at all times in the laboratory. Contact lenses may not be worn in the laboratory. Both of these can be purchased from the UTSC Bookstore. *You will not be allowed to work in the laboratory unless you are wearing approved eye protection and a lab coat.*

Absences from the laboratory: If you need to miss a laboratory period for any valid reason, you must immediately report it to your TA by phone or e-mail. You may also leave a message with one of the Lab Coordinators. If the reason for your absence is medical then you must download a UTSC Medical Note and have it completed by your doctor (http://www.utsc.utoronto.ca/~registrar/resources/pdf_general/UTSCmedicalcertificate.pdf).

Please make sure that your medical note includes the following:

- Verification that you were examined on the day of the missed lab
- The nature of the illness (if possible)
- A statement indicating the physician's professional opinion as to whether you should receive special consideration on medical grounds

The completed medical note should be given to your TA as soon as possible so that a makeup lab can be scheduled, provided that room can be found in another lab section. ***If no reason for your absence is made, a mark of zero will be given for that lab.***

Lab Skills Seminar: An optional seminar will be held each week during which the upcoming lab will be discussed. New techniques will be demonstrated, including a review of how to set up the relevant glassware or any other apparatus to be used. Background theory for the lab will be discussed, including a review of any relevant reaction mechanisms. The time(s) and location(s) for these seminars will be announced in class.

Method of Evaluation:

The following grading scheme will be used to calculate your final grade:

Graded Work	Value
ACE Homework Assignments*	5%
Laboratory**	25%
Term Test 1 (NO MAKE-UP)***	15%
Term Test 2 (NO MAKE-UP)***	15%
Final Exam	40%
Extra Credit Project (details TBA)	1.5%

*Your lowest grade will be dropped.

**You must pass the lab to pass the course.

***If you miss a test, its value will be added to that of the final.

Online Grades:

Individual grades will be posted on the *intranet* as they become available (not Blackboard). Please check these periodically to make sure that the posted grades match your own records. Any discrepancy should be reported immediately to the instructor or the lab coordinator, as appropriate.

Lecture Topics (tentative):

We will be covering most of the content from chapters 1-11; however, we will not be strictly adhering to the order presented in the text. Below is a detailed list of topics to be covered (in the approximate order that you will see them) along with the corresponding text book sections:

Part A: Structure

- 1) Organic molecular structure
 - a) Electronegativity and bonding (1.3)
 - b) Drawing organic structures: Lewis & Kekulé structures (1.4)
 - c) Resonance (1.22, 7.3-7.6)
 - d) Atomic orbitals and molecular orbital theory (1.2, 1.5-1.6)
 - e) Hybridization, bonding and geometry, molecular dipoles (1.7-1.15)
- 2) Introduction to saturated compounds
 - a) Alkanes
 - b) Functional groups: alkyl halides, alcohols, ethers, amines
 - c) Nomenclature (self-study: 2.0-2.7)
 - d) Structure, properties, intermolecular forces (2.8, 2.9)
 - e) σ bond rotation and conformations (2.10)
 - f) Cycloalkanes: ring strain, conformations, (2.11-2.14)
 - g) Stereochemistry (5.1-5.13, 5.16-5.17, 5.21)
- 3) Unsaturated compounds
 - a) Alkenes: Structure (3.1, 3.3-3.4) and nomenclature (self-study: 3.2, 3.5)
 - b) Alkynes: Structure (6.3-6.4) and nomenclature (self-study: 6.1-6.2)

Part B: Reactivity

- 4) Acid-Base Reactions
 - a) Acids and bases (1.16, 1.18, 1.26)
 - b) pH and pKa (1.17, 1.19)
 - c) Effect of structure on pKa (1.20-1.23, 7.9)
 - d) Effect of pH on structure (1.24)
- 5) Reactions of Alkenes
 - a) "What is a mechanism," arrow notation (3.6)
 - b) Thermodynamics, kinetics and reaction co-ordinate diagrams (3.7-3.8)
 - c) Electrophilic addition: carbocations, carbocation stability, transition states, regioselectivity, stereoselectivity, thermodynamic vs. kinetic control (4.1-4.4, 5.18-5.19, 7.7, 7.10, 7.11)
 - d) Addition of water or alcohol: mechanism, carbocation rearrangements (4.5-4.6)
 - e) Alternative electrophiles: halogens, oxymercuration, peroxyacids, borane, H_2 (4.7-4.11)
 - f) The Diels-Alder reaction (7.12)
 - g) Applications to synthesis (4.12)
- 6) Reactions of Alkynes
 - a) Electrophilic addition (6.5-6.9)
 - b) Acidity of the terminal alkynes; reactivity of the acetylide ion (6.10-6.11)

- c) Multistep syntheses (6.12)
- 7) Substitution and elimination Reactions
 - a) Organohalides and their properties (8.1)
 - b) The S_N2 reaction: nucleophiles, leaving groups, mechanism, stereochemistry (8.2-8.4, 8.7)
 - c) The S_N1 reaction: nucleophiles, leaving groups, mechanism, stereochemistry (8.5-8.8)
 - d) Competition between S_N2 and S_N1; role of the solvent (8.9-8.10)
 - e) Intramolecular reactions (8.11)
 - f) The E2 reaction: mechanism and stereoselectivity (9.1-9.2, 9.5)
 - g) The E1 reaction: mechanism and stereoselectivity (9.3, 9.5)
 - h) Elimination from cyclohexanes (9.6)
 - i) Competition between reactions (9.4, 9.8)
 - j) Application to Synthesis (9.9-9.11)
- 8) Reactions of Alcohols, Amines, Ethers and Epoxides
 - a) Alcohols as nucleophiles (10.1)
 - b) Alcohols as leaving groups (10.2-10.3)
 - c) Dehydration of alcohols (10.4)
 - d) Oxidation of alcohols (10.5)
 - e) Amines as nucleophiles and bases (10.6)
 - f) Reactions of ethers (10.7)
 - g) Reactions of epoxides and arene oxides (10.8, 10.9)
 - h) Grignard reagents (10.12)
- 9) Radical Reactions
 - a) Unreactive alkanes (11.1)
 - b) Chlorination and bromination: mechanism, radical stability, product distribution, stereochemistry (11.2-11.5, 11.7)
 - c) Radical addition to alkenes: mechanism, stereochemistry (11.6, 11.7)
 - d) Allylic and benzylic radicals: achieving control in radical reactions (11.8)
 - e) Application to synthesis (11.9)

Accessibility:

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the AccessAbility Services Office as soon as possible. I will work with you and AccessAbility Services to ensure you can achieve your learning goals in this course. Enquiries are confidential. The UTSC AccessAbility Services staff (located in S302) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations (416) 287-7560 or ability@utsc.utoronto.ca.

Academic Integrity:

Academic integrity is one of the cornerstones of the University of Toronto. It is critically important both to maintain our community which honours the values of honesty, trust, respect, fairness and responsibility and to protect you, the students within this community, and the value of the degree towards which you are all working so diligently.

According to Section B of the University of Toronto's Code of Behaviour on Academic Matters www.utoronto.ca/govcncl/pap/policies/behaveac.html which all students are expected to know and respect, it is an offence for students to:

- To use someone else's ideas or words in their own work without acknowledging that those ideas/words are not their own with a citation and quotation marks, i.e. to commit plagiarism.
- To include false, misleading or concocted citations in their work.
- To obtain unauthorized assistance on any assignment.
- To provide unauthorized assistance to another student. This includes showing another student completed work.
- To submit their own work for credit in more than one course without the permission of the instructor.
- To falsify or alter any documentation required by the University. This includes, but is not limited to, doctor's notes.
- To use or possess an unauthorized aid in any test or exam.

There are other offences covered under the Code, but these are by far the most common. Please respect these rules and the values which they protect. Offences against academic integrity will be dealt with according to the procedures outlined in the Code of Behaviour on Academic Matters.

