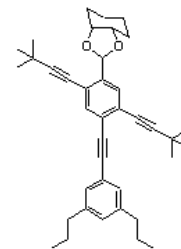


Organic Chemistry I (CHMB41H) - Fall 2012 University of Toronto at Scarborough



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. Organic chemistry can be an exciting subject with applications that are 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, 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

SW640

Email: esauer@utsc.utoronto.ca

Office Hours: Mondays, Tuesdays and Fridays from 2:00-3:30 pm

Lab Instructor:

Wanda Restivo

SW639

Email: restivo@utsc.utoronto.ca

Office Hours: Monday 11-12:30, Wednesday 2-3:30 and Thursday 11-12.

Email Policy:

Please use a valid "utoronto.ca" account for all CHMB41 correspondence. Emails received from other accounts are frequently filtered out as spam and may not be received. When composing your email, please use professional language. Be sure to include the course code as part of 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 (within 36 hours, unless it is a weekend or holiday)

Lecture Schedule:

Monday, Wednesday and Friday, 8:10-9:00 am in AC223

Online Lectures:

For those students unable to attend the 8 am lectures, or for anyone simply wishing to review the lecture material after the fact, all CHMB41 lectures will be taped and posted online. The link to these video recordings will be posted on Blackboard. Please note that each lecture will only be available for a period of two weeks after it's been posted. This is to encourage students to stay on top of the material and to avoid anyone falling too far behind.

Text:

Organic Chemistry, 6th Ed., by Paula Bruice. This text is available for purchase at the UTSC Bookstore. Also available is the accompanying *Study Guide and Solutions Manual*. This supplementary book is not required reading, however, many students find it useful. If you choose not to buy the study guide and solutions manual, you may use one of the several copies on reserve in the UTSC library.

Molecular models:

You are *strongly encouraged* to purchase a molecular model kit from the UTSC bookstore (Flexible Molecular Model Kit, made by Darling Models). These will become an invaluable tool as the course progresses since several key topics require visualization and manipulations of compounds in three-dimensions. Note that each kit contains enough pieces that it could easily be shared by 2 or 3 students.

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.***

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 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 "Mastering Chemistry." ***Access to this online homework system is free!*** Details on how to register will be provided on Blackboard.

Problem sets will be released every Friday evening and will be due the following Friday at 11:59 pm. 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 Test:

There will be one, 90 minute term test written outside of class time. The exact date, time, location and material to be tested will be announced as soon as they are available. Any student who misses the mid-term for a legitimate reason must ***submit appropriate documentation within 48 hours of their absence.*** If the reason is medical, an official UTSC medical form should be downloaded from the registrar's website and completed by your doctor (http://www.uts.utoronto.ca/~registrar/resources/pdf_general/UTSCmedicalcertificate.pdf).

Students with a validated absence will be permitted to write a make-up exam. Students without a validated absence will receive a grade of zero for the missed 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.***

Online Safety Quiz:

During the first week of classes, you will be required to complete an online safety quiz. A passing grade on this quiz is required in order to participate in your first lab experiment. Details on the quiz will be posted on Blackboard.

Lab Schedule:

Odd numbered lab sections: Your first lab will be in the week of Sept 17th
Even numbered lab sections: Your first lab will be in the week of Sept 24th

Lab Manual:

This must 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. 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 both instructors (lab and lecture). If the reason is medical, an official UTSC medical form should be downloaded from the registrar's website and completed by your doctor (http://www.utsc.utoronto.ca/~registrar/resources/pdf_general/UTSCmedicalcertificate.pdf).

Students with a validated absence may be permitted to complete a makeup lab, 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:

A series of optional seminars 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 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 on Blackboard.

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.

Method of Evaluation:

Graded Work	Value
Mastering Chemistry Assignments*	5%
Laboratory	25%
Term Test,	25%
Final Exam	45%

*Your lowest grade will be dropped.

Note: To pass the course, you must meet the following three criteria: earn a passing grade in the course overall, pass the laboratory and pass *either* the term test or the final exam

Online Grades:

Individual grades will be posted on the intranet as they become available. 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 1-12; 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. Note that some sections are designated as self-study; this material will not be discussed in detail during lecture.

Part A: Structure

- 1) Organic Molecular structure
 - a) **First year review (self-study: 1.1-1.15)**
 - b) Delocalized electrons (7.1-7.6)
- 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) Conformations of alkanes and cycloalkanes (2.10-2.14)
- 3) Introduction to 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)**
- 4) Stereochemistry
 - a) Chirality, asymmetric centres and stereocentres (5.1-5.3, 5.5, 5.17)

- b) Enantiomers and their properties (5.4, 5.8-5.10, 5.16)
- c) Nomenclature of chiral centres (5.7, 5.13)
- d) Fischer projections (5.6)
- e) Compounds with more than one stereocentre (5.11-5.12)

Part B: Reactivity

- 5) Acid-Base Reactions
 - a) **First year review (self-study: 1.16-1.17, 1.26-1.27)**
 - b) Organic acids and bases (1.18)
 - c) Acid base reactions (1.19-1.20)
 - d) Effect of structure on pKa (1.21-1.24, 7.9)
 - e) Effect of pH on structure (1.25)
- 6) Reactions of Alkenes
 - a) "What is a mechanism," arrow notation (3.6)
 - b) Thermodynamics, kinetics and reaction coordinate diagrams (3.7-3.9)
 - c) Electrophilic addition: mechanism, carbocation stability, regioselectivity, stereoselectivity (4.1-4.4, 5.18-5.20, 7.7, 7.10)
 - d) Addition of water or alcohol: mechanism, carbocation rearrangements (4.5-4.7)
 - e) Alternative electrophiles: halogens, oxymercuration, peroxyacids, borane, H₂ (4.8-4.13)
- 7) Reactions of Dienes
 - a) Stability of conjugated dienes (7.8)
 - b) 1-4 Addition mechanism, kinetic versus thermodynamic control (7.10-7.11)
 - c) The Diels-Alder reaction (7.12)
- 8) Reactions of Alkynes
 - a) Electrophilic addition (6.5-6.9)
 - b) Diels-Alder reaction (7.12)
 - c) Acidity of the terminal alkynes; reactivity of the acetylide ion (6.10-6.11)
 - d) Multistep synthesis (6.12)
- 9) Substitution Reactions
 - a) The S_N2 reaction: mechanism, nucleophiles, leaving groups, stereochemistry, reversibility (8.1-8.3, 8.6-8.7)
 - b) The S_N1 reaction: mechanism, nucleophiles, leaving groups, stereochemistry (8.4-8.7)
 - c) Competition between SN2 and SN1; role of the solvent (8.8-8.9)
 - d) Intramolecular reactions (8.10)
- 10) Elimination Reactions
 - a) The E2 reaction: mechanism, regioselectivity, stereoselectivity (9.1-9.2, 9.5)
 - b) The E1 reaction: mechanism, regioselectivity, stereoselectivity (9.3, 9.5)
 - c) Elimination from cyclohexanes (9.6)
 - d) Competition between reactions (9.4, 9.8)
 - e) Application to Synthesis (9.9-9.10)
- 11) Reactions of Alcohols, Amines, Ethers and Epoxides
 - a) Alcohols as nucleophiles (10.1)
 - b) Alcohols as leaving groups (10.2-10.4)
 - c) Oxidation of alcohols (10.5)
 - d) Cleavage of ethers and epoxides (10.6-10.7)
- 12) Organometallic Compounds
 - a) Organolithium and organomagnesium compounds as nucleophiles (11.0-11.2)
 - b) Palladium catalyzed coupling reactions: Suzuki, Heck (11.5)

- c) Alkene metathesis (11.6)
- 13) Radical Reactions
- a) Unreactive alkanes (12.1)
 - b) Chlorination and bromination: mechanism, radical stability, product distribution, stereochemistry (12.2-12.5)
 - c) Radical addition to alkenes: mechanism, stereochemistry (12.7-12.8)
 - d) Allylic and benzylic radicals (12.9)
 - e) Application to synthesis (12.10)

Ancillary Fees:

The Department of Physical and Environmental Sciences at UTSC provides state-of-the-art education in chemistry. Chemistry being an experimental science makes learning in a laboratory setting critical. In order to provide the latest technology to enhance the student learning experience, UTSC will be charging ancillary fees for all chemistry courses that have a laboratory component. Those fees are used to recover the cost of materials and services used during the lab and to maintain and upgrade the equipment used by students. To view a complete list of those fees, students are encouraged to visit the following link:

[http://www.planningandbudget.utoronto.ca/Assets/Academic+Operations+Digital+Assets/Planning+!\\$26+Budget/2012-13+Category+5+Ancillary+Fees.pdf](http://www.planningandbudget.utoronto.ca/Assets/Academic+Operations+Digital+Assets/Planning+!$26+Budget/2012-13+Category+5+Ancillary+Fees.pdf)

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 <http://www.governingcouncil.utoronto.ca/policies/behaveac.htm> 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.