



## Organic Chemistry II CHMB42H3 2013 Winter



### Course Outline

*This document contains important course information and should be kept in a safe place where you can refer to it throughout the term.*

**Welcome to the CHMB42H3: Organic Chemistry II:** CHMB42 provides an introduction to compound determination using various spectroscopic methods. As well you will learn about aromatic substitution, carbonyl chemistry and biologically important compounds such as carbohydrates, and heterocycles. You will have a four hour lab every other week alternating with a one hour tutorial.

CHMB42 is prerequisite for almost all other further chemistry and biology and biochemistry courses at UTSC.

**Instructor:** Dr. Lana Mikhaylichenko

Contact: [mikhay@utsc.utoronto.ca](mailto:mikhay@utsc.utoronto.ca)

(416) 287-7207, SW633A or SW162 (416)-287-7222

**Lectures:** Tuesday 5-6 pm, Wednesday 8-9 am, and Friday 2-3 pm in AC223

**Office hours:** Tue 2:00-3:00 pm (SW633A), Wed 10:00 am – 11:00 pm (SW162) or 3:00-4:00 pm (SW162 or SW159) if not in a lab

You can also see me during lab skills seminars and discussion sessions.

#### Required Text Books:

P.Y. Bruce, Organic Chemistry, 6<sup>th</sup> ed., Pearson.

P.Y. Bruce, *Study Guide and Solutions to Organic Chemistry*, 6<sup>th</sup> ed., Pearson

(You can also use 5<sup>th</sup> or even 4<sup>th</sup> edition for this book and Study Guide)

This is the same text you would have used in CHMB41. It is an excellent text and will be used for some third year courses as well, such as CHMC47 and will be a useful resource for CHMC41/42.

If you did not use it last term you may purchase it in the bookstore along with the study guide

The publisher's web site at: <http://pearsoncanada.ca/> includes media materials, which supplement the text.

#### Recommended Websites:

Virtual Textbook of Organic Chemistry:

<http://www.cem.msu.edu/~reusch/VirtualText/intro1.htm>

Interactive Tutorials:

<http://www.cem.msu.edu/~reusch/VirtualText/Questions/problems.htm>

### Online Homework:

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 11:50 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.

The online homework counts for 3% of your final grade and can make a huge difference in helping you understand the course material and ultimately improving your grade. I will post practice problem sets online (they will be not graded) as well as the graded problem sets. All of these problem sets will count equally to the 3% total.

**Clickers:** You should have one from last term or from first year. They will be used in class so that you may participate in the questions that will be presented periodically throughout the lectures. They will not be used for credit.

### Methods of Evaluation:

**Labs: 25%**

5 experiments and final lab test- see manual \*There will be no makeup for the lab test\*

**Tutorials quizzes: 2%** (you will have a quiz at every tutorial including a first one)

**Online homework: 3%**

**Midterm Test: 25%**

**Final Exam: 45%**

*\*Up to three bonus marks (in addition for your final exam 45 grades) could be assigning for the course extra curriculum activities. Please see the information at the end of this syllabus.*

If you are sick you must provide the University of Toronto medical certificate within one week of your missing the lab/test/tutorial. It must be dated the day of the illness and must state that you were unable to write/do the lab/test/tutorial. Every effort will be made to allow you to make up the lab/test/tutorial. All notes should be given to Dr. Lana. Note that the labs are full and this will be problematic in trying to do a makeup lab.

**Missing a lab because you have a test that day is not a valid excuse and you will receive a mark of 0 for that lab.**

*To achieve a passing grade in this course you must pass both the lab and either the midterm or the final exam. If you fail both, you will **NOT** receive a passing grade. The extra credit will not be counted towards achieving a pass in the course.*

**Communications:** via e-mail, office hours, discussion sessions, and Blackboard

Please note that lecture notes, announcements, and lab and midterm marks will be found on **Blackboard**. Discussion groups will be found on Blackboard as well. You may access it at:

<https://portal.utoronto.ca/>

You should get used to checking this site frequently for any important announcements. All your individual marks will be displayed on the **Blackboard** once they have been completed. You will have 2 weeks from the time they go up to check for errors. A final date will be given, after that date no corrections will be accepted.

### **Learning Outcomes for the Course:**

By the end of this course, students will be able to:

1. Became familiar with modern spectroscopy methods such IR, NMR, and mass spectroscopy.
2. Name aromatic compounds, carboxylic acids, acyl halides, acid anhydrides, esters and amides, ketones, aldehydes, and carbohydrates using UPAC rules.
3. Give mechanisms for electrophilic and nucleophilic substitution reactions in aromatic compounds.
4. Compare and contrast the structures, properties, and reactions of carbonyl compounds (aldehydes, ketones, carboxylic acids, acyl halides, anhydrides, esters, amides), amines, heterocycles, and carbohydrates.
5. Give the mechanisms for nucleophilic addition in carbonyl compounds, nucleophilic and electrophilic substitution in aromatic heterocycles.
6. Explain the stereochemistry of nucleophilic addition reactions, D&L notation for carbohydrates.
7. Predict major and minor products of reactions based on reaction data and explain why/how they are formed.
8. Distinguish between enantiomers, diastereomers, meso- and other forms of isomers.
9. Design syntheses for organic compounds and evaluate potential mechanistic problems associated with them.
10. Formulate and perform the laboratory synthesis, purification, and characterization of the organic compounds studied.

### **Assessments:**

Learning outcomes will be assessed through the following things: on-line homework and tutorial quizzes, class work, tutorials, exams, laboratory experiments, lecture games, and extra curriculum activities.

### Study Hints:

Organic chemistry is a cumulative subject. As such, an understanding of new material depends on mastery of topics discussed in previous chapters, including that which was taught in Organic Chemistry I. **Keep up with the material –do not let yourself get behind!!!**

### Online viewing (please read this!):

The lectures will be videotaped and posted online. You will be able to view them for up to two weeks after the actual lecture and they will be not available after that. It is your responsibility to keep up with the material if you decided not to come to the actual lecture or have a conflict with it.

**Lecture Schedule:** This is a rough guide only and may change throughout the term.

Lec #	Week of	Subject	Reading (Bruice 6 <sup>th</sup> ed.)	Reading (Bruice 5 <sup>th</sup> ed.)
1	Jan. 7 <sup>th</sup>	<b>Mass and IR spectroscopy</b>	Ch 13	Ch 12
2	Jan. 14 <sup>th</sup>	<b>IR and NMR spectroscopy</b>	Ch 13 and 14	Ch 12 and 13
3	Jan. 21 <sup>st</sup>	<b>NMR spectroscopy</b>	Ch 14	Ch 13
4	Jan. 28 <sup>th</sup>	<b>Aromaticity. Reactions of Benzene</b>	Ch 15	Ch 14
5	Feb. 4 <sup>th</sup>	<b>Reactions of Substituted Benzenes</b>	Ch 16	Ch 15
6	Feb. 11 <sup>th</sup>	<b>Carbonyl Compounds I</b>	Ch 17	Ch 16
	Feb. 18 <sup>th</sup>	<b>Reading week</b>		
7	Feb. 25 <sup>th</sup>	<b>Carbonyl Compounds II</b>	Ch 18	Ch 17
8	Mar. 4 <sup>th</sup>	<b>Carbonyl Compounds III</b>	Ch 19	Ch 18
9	Mar. 11 <sup>th</sup>	<b>Carbonyl Compounds III</b>	Ch 19	Ch 18
10	Mar. 18 <sup>th</sup>	<b>More About Oxidation-Reduction Reactions</b>	Ch 20	Ch19
11	Mar. 25 <sup>th</sup>	<b>More About Amines Heterocyclic Compounds</b>	Ch 21	Ch 20
12	Apr. 1 <sup>st</sup> Apr. 8 <sup>th</sup>	<b>Carbohydrates</b>	Ch 22	Ch 21
Winter Term Exams	TBA	<b>Tree hours term test</b>		

**Assigned problems will be posted with the every lecture material.**

**Tutorials**- 1 hour in length -alternating with lab schedule

**Even** numbered practicals begin Jan 14<sup>th</sup> , **odd** begin Jan 21<sup>st</sup>

Day	Time	Room		Practical Number
		Week 1	Week 2	
Wednesday	12-1	AA206	SW143	1/5; 2/6
		SW319	SW143	3/7; 4/8
Thursday	1-2	HW214	HW215	9/11,10/12
		HW214	IC320	13/15, 14/16
Friday	11-12	BV355	HW402	17/19, 18/20
		BV355		

The tutorials will be assigned based on your lab number so you cannot sign into one. Last day for signing into a practical section will be Jan 11. Any change after that date will have to be requested of Dr. Lana if space allows.

**Attendance Policy: You cannot be late to tutorial or lab. If you are you may forfeit your attendance grade (tutorial) or quiz (lab)**

There will be 5 tutorials. You must attend at least 4 of them. Each tutorial will have a quiz. I do not need to have a reason or note if you miss one. It will be your choice. However if you miss 2 tutorials (i.e. attend only 3) then you will have 0.5 % deducted from your final grade. You will have a further 0.5% deducted for every subsequent absence for the missing quiz. Again no notes or excuses will be accepted. So use this “free” day wisely. If you will attend all five tutorials and write all five quizzes when the lowest quiz mark will be dropped from final grade calculations.

**Labs**- 4 hours in length - every other week

**Lab Manual:** purchased in the bookstore and is required for all lab practicals.

Please note that we do not print enough manuals for the students in the class in the first week since students are still “shopping” their courses. **Do not wait until the last minute to purchase your manual** as you may be out of luck. If this happens you will purchase the manual from the bookstore and they will be printed on request which may take up to 3 days. **If you come to lab saying that you could not purchase a manual then you will not be accommodated and will receive no credit for that lab.**

There are 5 labs and a lab test which is cumulative. It may be both written and practical. There will be a quiz (10 minutes) at the beginning of **every lab, including the first one.** (The questions at the back of the experiments will not be graded. Answers to these questions will be discussed during Lab Skills seminars.

**Safety videos and quiz—see Blackboard under Labs for instructions. You must pass the quiz before being allowed to complete the lab.**

**Odd # labs begin: Jan 14 (week 1)(Even numbered labs will have a tutorial)**  
**Even # labs begin: Jan 21 (week 2) (Odd numbered labs will have a tutorial)**

<b>Day</b>	<b>Time</b>	<b>Room</b>	<b>Practical number</b>
Wednesday	9-1	SW153	1,3 / 2,4
Wednesday	9-1	SW159	5,7 / 6,8
Thursday	1-5	SW153	9,11 / 10,12
Thursday	1-5	SW159	13,15 / 14,16
Friday	9-1	SW153	17,19 / 18,20

**There will be lab lists posted outside the lab with seat numbers at the beginning of your first lab.**

### **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+Budget/2012-13+Category+5+Ancillary+Fees.pdf>

### **Class notes:**

Sets of *incomplete notes*, including figures discussed in class, will be available on the class Blackboard page prior to the corresponding lecture. You are responsible for printing these notes and bringing them with you to class. **You will be responsible for all material covered in lecture, even if it is not included in the online notes;** you must attend lecture or view the whole thing online in order to get additional information.

### **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](mailto:ability@utsc.utoronto.ca).

### **Academic Integrity:**

Academic integrity is one of the cornerstones of the University of Toronto. It is critically

important 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.

### Steps toward success in Organic Chemistry II:

1. **Look through the chapter before lecture.** It is not necessary to read the whole chapter before class, but look at headings and schemes, specifically trying to find similarities to topics that you already know. Much of organic chemistry follows the same trends, and identifying common themes will make studying and learning the material much easier.
2. **Go to class.** Go to class every time and pay attention during class. Historically students who attended class lectures did much better on a final exam compare to students who decided to watch it online.
3. **Do practice problems!** This is the most important and most productive way to study and ESSENTIAL to you success in the class. Work as many problems as you can, but realize that reading the solution manual is not the same as solving a problem on your own. If you have a difficult time with the problem, it will be much more beneficial to you if you reread the appropriate section of the textbook (and online text if you need additional explanations) than if you simply read the answer.
4. **Ask questions!** Attend office hours and discussion sessions. **Discussion sessions** proven to help students do better on midterm and final exams. These are scheduled for a 1-2 hour session each week and your attendance is voluntary. We will be going through extra problems either assigned or not from the text and other sources. Due to scheduling problems it may not be a time that everyone can come, therefore find a friend who can and get their notes and ask them to go over the material. These sessions will not be videotaped. They will start the week of Jan 21. Time and room TBA

- 5. A peer facilitator program, FSG-** Facilitated Study Group is being run through the Centre for Teaching and Learning. These weekly sessions are open to all students taking this course who want to improve their understanding of course material, improve their study techniques, and improve their grade. Attendance is voluntary. In these sessions you will compare notes, discuss important concepts, develop study strategies, and prepare for exams and assignments on course material. Course material is NOT re-lectured. The FSG's are lead by a trained facilitator who has previously taken the course. A survey will be taken during the first week of class to determine the best days and times for most students, and they will begin probably the 2nd or 3rd week of class.
- 6. Lab Skill Seminars** will help you with this course lab component. There will be lab skills seminars throughout the term. These are run by Service Learning students. They are booked for Tuesday 6-7 in AC223 and Fridays 3-4:30 in SW221. Any changes will be posted on Blackboard
- 7. Online Discussion board on Blackboard-** This the best place to ask questions related to the course as the questions will get answered quickly by your peers and the answer will get out to the most people. Our Service Learning student will be monitoring this forum.
- 8. Chem Aid Centre-** volunteers will be available in SW221 to help you with any questions in course material. These are students who have taken several chemistry courses and will be able to help you with any problems.  
Days and times of their availability will be posted on Blackboard once finalized

This course has a reputation for being tough which is unfounded. It is a course that requires a lot of TIME and PRACTICE. You will be unsuccessful if you do not keep up on the material every day. This course is like building a house. If the foundation is not well built the rest will crumble. You may have to go over your material from CHMB41over and over. Use your text book to its fullest potential.

### Class extra activities

1. We are going to introduce Jeopardy games in this course. Student from Service Learning program is responsible for making these games available to you. Your help of making Jeopardy game questions will be greatly appreciated and rewarded. I assigned an extra bonus mark in addition to your final exam grade for participation in this activity. You will be expected to create at least three accepted questions related to the lecture material. Each accepted question **MUST** be from different chapters. You must submit your question(s) no later than Friday followed by the last lecture for the given chapter. All questions must be submitted in **electronic format with structures written using ChemDraw program**. This program is available for free to all U of T students through library website. The direct link will be posted on the course Blackboard page. You can download into three different computers and it is very useful for the upper year's chemistry and biology courses. Please state the title of the chapter for these questions and resource (you **MUST** include it even if this book is written in your native language). All questions must be submitted to **David Wu** ([dav.wu@mail.utoronto.ca](mailto:dav.wu@mail.utoronto.ca)) and **Jolie Lam** ([jolie.lam@mail.utoronto.ca](mailto:jolie.lam@mail.utoronto.ca)). They will review your questions and will let you know which question has been accepted. The questions must be related to the class material, must be **NOT** from your text book and must be ever be funny, practical, or



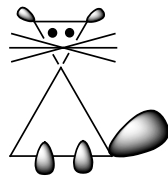
challenging. You could create multiple choice questions or a short answer questions. You can create your own question or use some extra sources of information. In this case please let us know the original resource. We are looking forward to see your questions. **Your question(s) could appear in your final exam! You must work alone on this project.**

2. The other project will be a **Molecule of the Week**. You will be expected to create a short power point presentation (5-7 min max) based on the material which we are currently studying. You can pick one molecule from the chapter's material and make a brief overview about its discovery, physical and chemical properties, and practical application. I will post a list of potential topics but you definitely can create your own topic. Please let us know what topic did you pick (e-mail me and David and Jolie) before you start working on this project. Each group of students must work on their own topic. If you like that topic but somebody already pick it when you must to look for the other one. Presentation must contain interesting and challenging material. You can do this alone or as a group (**not more than two students in a group is allowed**). You should submit your presentation no later when Friday, March 29<sup>th</sup>. I would recommend submitting it a little bit earlier (at least up to three days before deadline). You will have time to fix your mistakes in this case. We will contact you and let you know if your presentation will be accepted. **The full mark will be assign to each member of the group after you will present it** to me, Jolie and David. Time and location for presentations will be discussed later, closer to the date and will be posted on a course Blackboard page.
3. We are also looking for the songs or poems related to the course material. The example of such projects will be shown to you in class. **This could be done as a group or an individual project (not more than six students allowed to participate in each group)**. Each group member will be rewarded with an extra credit in case if we will approve your project. Songs must be related to the course or lab material. Please contact me or David and Jolie before you will start working on your project. We will discuss it with you and give you some feedback on your material before you start making actual video. The final video could be uploaded to YouTube. Project must be submitted no later when 6 pm on Monday, April 8<sup>th</sup> to **David and Jolie** and cc-ed to me.  
Full or partial mark will be assigned for each project depending on the quality of the material and video.

We are also open to any ideas that you may find interesting. Please come and talk to me in person if you will have any, it could be counted as your extra credit.

**Please use this opportunity to improve your mark in the course!**

**I am looking forward to see you all and work with you!**



**PS.** This picture has been done using ChemDraw program (I picked a cat because I like them 😊). This is a very useful program in chemistry and biochemistry and you should definitely download one if you do not have it yet. The link will be posted on a course Blackboard page.