



Organic Chemistry II - CHMB42 Winter 2017



Welcome to Organic Chemistry part 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.

Lectures: Tuesday 5-7, Friday 2-3 in AC223 (the ARC)

Instructors:

Wanda Restivo

Lecturing until Reading Week
but lab coordinator for whole term.

EV560 (office), 416-287-7222 and EV127 (lab) 416-287-7656

restivo@utsc.utoronto.ca

Office hours: Monday 1-2:30 in EV 560, Tuesday 10-12 in EV 123, Thursday in EV 560 11-12 and anytime the labs are running (Wed and Fri am, Thurs aft)

Dr. Lana Mikhaylichenko from mid Feb until April

EV556 (office), 416-287-7207

mikhay@utsc.utoronto.ca

Office hours: TBD

Email Policy:

Please use a valid "utoronto.ca" account for all CHMB42 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. If it is in regards to your lab please include your practical number and the name of your TA. 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 double check the syllabus and course Blackboard page before emailing me with a question. The answers to most student questions can be found there! Questions regarding the lecture material/assigned readings/suggested problems should be posted on the discussion board (see below) rather than emailed. This will ensure that others can benefit from the responses provided and avoids having the same questions asked multiple times. Questions on the lab material should be directed to the lab coordinator or your TA.



Text:

Organic Chemistry (8th Edition) by Paula Yurkanis Bruice, Prentice Hall publishing.

This is the same text you would have used in CHMB41. The text has an accompanying study guide/solutions manual which is not required, but is strongly recommended. The UTSC Bookstore sells a bundled package which includes the text and

study guide/solutions manual. You may also use the 5th to 7th edition but the chapter numbers and problem numbers may be different. It will be your responsibility to follow along. There will be 8th edition texts and solution manuals available in the library on short term loan.

Online Homework:

There will be weekly homework assignments to be completed using the online homework **Mastering Chemistry**.

<http://www.pearsonmylabandmastering.com/northamerica/masteringchemistry/>

If you have issues signing in please see the following video. <http://screencast.com/t/4Np2bM71t>

The course title is: CHMB42 17W WL (MCRESTIVO14458)

Please remember to use your 10 digit student number as your ID for the online homework.

The problem sets will be released Wednesday morning and they are due 1.5 weeks later on the Monday at 11 pm. This gives you 2 weekends to work on them. The first one will be released Jan 2 and due Jan 23- I have given you extra time as it will be a larger than normal problem set. The assignments will be equally weighted and recorded as a percentage. They will cover the material discussed in class. Late assignments will not be graded. 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. If you choose to not purchase the online homework system then your grade will be added to the final exam.

Discussion Board:

An online discussion board will be maintained through Blackboard. This online space will provide you with a place to post questions related to the course material. You must post as yourself. Feel free to answer each others' questions as well. The forums will be monitored by the instructor and/or a science engagement student to ensure that all questions are answered accurately. In addition, frequently asked questions (with their answers) may 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 promptly removed.

Learning Catalytics

We will be using this but no participation marks will be assigned. Participation is strongly encouraged as you may see similar question in your final exam. Final exam is cumulative and will contain questions from midterm material part as MCQs.

Course Organization:

Lectures-

Total of 3 hours per week. The lecture schedule is a rough guide and may be flexible. Incomplete notes will be provided for you on Blackboard. You should print them off and bring them with you to class. You should also bring some blank paper. You will be responsible for all material covered in lecture, even if it is not included in the online notes. Assigned problems will be posted with the lecture material or posted on Blackboard. It may seem like there are so many questions but many of them are quickly answered when going through the reading of the chapter. You will be successful in this course by doing the problems and coming for help when difficulty arises. If you find you are taking a long time to answer a question- read the notes and the chapter again before attempting the question. If you are still having trouble seek help immediately....do not wait.

CHMB42H3 Lecture Schedule (*Tentative)

Week	Topic	Suggested Reading (Bruice 8 th ed.)	Suggested Reading (Bruice 7 th ed.)	Suggested Readings (Bruice 6 th ed.)
Week of				
Jan 2	Mass Spec/Infrared	13.1-.2,13.4,13.6(part), 13.10-13.17	14.1-.2,14.4,,14.6(part), 14.10-14.17	13
Jan 9	Infrared/NMR	14.1-14.15,	15.1-15.15,	13 & 14
Jan 16	NMR	14.17-14.20	15.17-15.20	14
Jan 23	Aromaticity and Reactions of Benzene	8.9-8.10, 8.16-8.21, 18.1-18.11	8.7 -8.12, 19.1-19.12	15
Jan 30	Rxns of Benzene cont'd/Reactions of substituted Benzenes	18.12-18.19	19.13-19.25	16 & 17
	Carboxylic acid Derivatives	15.1-15.8	16.1-16.8	
Feb 6	Carboxylic acid Derivatives cont'd	15.9-15.22	16.9-16.22	
Feb 13*	Reactions of Aldehydes and Ketones, More Reactions of Carboxylic Acid Derivatives, Reactions of α , β Unsaturated Carbonyl Compounds	16.1-16.6, 16.7-16.12	17.1-17.6, 17.7-17.12	18
*	<i>Feb 14- 3 hour lecture, LSS cancelled and Feb 17- no lecture</i>			
Feb 21-24	READING WEEK			
Feb 27	Reactions of Aldehydes and Ketones cont'd/ Reactions at the α -carbon of Carbonyl Compounds	16.13-16.18, 16.19,17.1-17.3	17.13-17.18, 17.19,18.1-18.3	18,19
Mar 6	Reactions at the α -carbon of Carbonyl Compounds cont'd	17.4-17.8, 17.9-17.22	18.4-18.8, 18.9-18.22	19
Mar 13	More About Amines, Reactions of Heterocyclic Compounds	19.1-19.4 19.5-19.8	20.1-20.4 20.5-20.8	21
Mar 20	The Organic Chemistry of Carbohydrates	20.1-20.5 20.6-20.19	21.1-21.5 21.6-21.19	22
Mar 27	The Organic Chemistry of Carbohydrates cont'd/ Exam Review Session			

This is a tentative schedule. Some parts of the lecture, like naming for example, we will leave for you to go over on your own time. We hope to be doing more problems in class. Some of these will be from your text but most will be from other sources.

Online viewing:

For those students who wish to review the lecture after the fact, all CHMB42 lectures will be taped and there will be a link for 'Lecture Cast' from the course Blackboard page. These lectures will be kept for 2 weeks and then removed. They will **NOT** be available for exam review so make sure you keep up during the term and please do not ask for them to be uploaded again...the answer will be no. Forward queries to webopt@utsc.utoronto.ca.

Labs:

The laboratory component of CHMB42 is compulsory. **In order to pass the course, you must also pass the lab component. The lab component is worth 25% of your overall grade.**

Lab Manual and notebook:

A lab manual must be purchased from the Bookstore. 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 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 five labs and a lab test which is cumulative. It may be both written and practical.

On your first day to the lab you will have to bring a copy of your WHMIS training quiz. Instructions on how to access this will be posted on Blackboard under the title: **Workplace Hazardous Materials Information System**. You must have received a 80% as a minimum grade. You will not be able allowed into the lab if you do not provide this hard copy of your results to your TA. See the Blackboard course content under labs for more information.

You should continue to use the same notebook that you used for CHMB41. Many of the chemicals will be the same and you can refer back to those pages when writing new MSDS data. Also the techniques you learned in that course will be handy in case you need to refer back to them. Your MSDS information must be hand written, by you, in your notebook. Do not print off MSDS and staple it into your notebook. If you do so you will be asked to leave the lab until your MSDS is properly written in your notebook.

There will be lab lists posted outside the lab with your name and seat numbers. When you come for your first lab you must have your lab coat and goggles on, have the TA check your notebook and hand in your scored WHMIS sheet you may then proceed into the labs and your seat. You will also find Videos on techniques linked from Blackboard. These links are available in your manual.

Ancillary Fees: Students taking CHMB42 will be assessed a \$25.00 ancillary fee which will cover the cost of chemicals, filter paper, Pasteur pipettes and other items consumed over the course of the lab. For more information regarding ancillary fees students are encouraged to visit the following website:

<http://www.planningandbudget.utoronto.ca/tuition.htm>

Lab Schedule:

Odd numbered labs will start on January 11, 12 and 13. -Even numbered labs will be January 18, 19 and 20.

<u>Room</u>	<u>Wed 9-1</u>	<u>Thurs 1-5</u>	<u>Fri 9-1</u>
EV 112	1/2	13/14	
EV 113	3/4	15/16	
EV 114	5/6	17/18	
EV 122	7/8	19/20	25/26
EV 123	9/10	21/22	27/28
EV 124			

Lab Rules:

- Be punctual. 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 and are for you to try. Similar questions may be used in the quizzes.)
 - Be prepared. Msds data in your notebook as well as a flow chart of your experiment, theoretical yield (if applicable) and intro is required. Your TA will be checking your notebook every time before entrance to the lab. **If they feel you are not prepared you will be denied entrance and you will receive a grade of 0 for this lab.**
 - Be there. Part of the lab mark is based on your ability to answer, with competence, the questions of the TA's and instructors. This is a performance mark and more information is given in your manual.
 - You must wear safety goggles, a lab coat and **have your legs and feet covered.No SHORTS**
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Policy on Missed Tests or labs:

Should you miss the midterm test or lab due to a legitimate reason, you must contact Wanda restivo@utsc.utoronto.ca, or by phone 416-287-7222 immediately and submit appropriate documentation within 48 hours of your absence. If the reason is medical, an official UTSC medical note must be provided. See link below:
http://www.utsc.utoronto.ca/~registrar/resources/pdf_general/UTSCmedicalcertificate.pdf

The doctor must state that you had moderate to severe symptoms for any makeup consideration.

I will try to do my best to have you do a makeup lab. For the test there will be a make-up exam within 1-2 weeks of the term test written at the instructors' convenience. If you miss the makeup exam you will receive a grade of 0.

Please note that students will not be allowed to re-schedule or miss labs on the days of any exams from either this or other courses. This is a Chemistry Discipline Policy.

Term Test

There will be one 100 minute term test worth 27% of your final grade sometime after Reading Week. This will be written outside of class time, time TBD. The exact date and time will be provided once the information becomes available from the registrar. It will only cover the material taught before Reading Week by Wanda.

Final Exam:

There will be a final 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 deferred exam in the next formal exam period. Check the UTSC Calendar for instructions and deadlines.***

Method of evaluation:

<u>1 Midterm test-</u> (~2 hours) All chapters taught before Reading week inclusive Exam schedule TBA	27%
<u>Online homework</u>	3 %
<u>Lab</u> 5 experiments and final lab test- see manual *There will be no makeup for the lab test.	25% (must pass to pass course)

Final exam during final exam schedule (cumulative)	45% (must pass either midterm or final to pass course)
Extra credit- information at the end of the syllabus	Up to 3%- must have passing mark first

Note that you must pass the lab and either the midterm or final exam to be eligible to pass this course. The extra credit will not be counted towards achieving a pass in the course.

Communication:

All grading in this course will be on the course site on Blackboard. You should monitor your grades as they go up and you will have 2 weeks from the time they go up to check for errors. Your final term grade will be posted and a final date will be given, after that date- no corrections will be allowed.

Lecture notes, announcements, will be found on **Blackboard**. Discussion groups will only be found on Blackboard. You may access it at:

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

You should get used to checking this site frequently for any important announcements.

Academic Policy:

Academic integrity is important to maintain our community which honours the values of honesty, trust, respect, fairness and responsibility and to protect you and the value of the degree towards which you are all working so diligently

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

It is an offence for students 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
- Include false, misleading or concocted citations in their work.
- Obtain unauthorized assistance on any assignment
- 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.- eg: doctor’s notes
- To use or possess an unauthorized aid in any test or exam.

There are other offences under the Code, but these are the most common.

Please respect these rules. Offences will be dealt with according to the procedures outlined in the Code of Behaviour on Academic Matters.

Accessibility:

In this course students with diverse learning styles and needs are welcome. In particular, if you have a disability/health consideration, that may require accommodations, please feel free to approach me and/or the Access/Ability/ Services Office. I will work with you and Access/Ability /Services to ensure you can achieve your learning goals in this course. Enquiries are confidential. The UTSC access/Ability/ 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

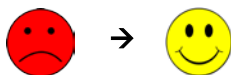
Academic Advising and Career Centre- AC213

www.utoronto.ca/aacc

The wonderful people in this department are there to help you with: exam preparation and writing, writing resumes, choosing courses, creating a timeline for graduation, career research, and so much more. They also will help you find the right people to help you with your academic success.

Our hints to your success!!

- Please stay current with the material. The course is highly cumulative. Ideas introduced early on will be used to develop other concepts later. Thus, letting things slide is unwise, as the material begins to accumulate relentlessly. As the semester progresses and other demands on your time increase, playing catch-up will be harder to do. Furthermore, it is possible, indeed likely, that many of the concepts in the course will become clear only after you have had a chance to ponder them for a while. **This period of reflection is critical and hence the need for time.** So try not to learn everything at once. Even a half-hour of regular study each day is likely to be more useful to you than any all-night, caffeine-powered cramathons. **THE BENEFITS OF SLEEP CANNOT BE UNDERVALUED- IT IS WHEN YOU PUT THINGS IN LONG TERM MEMORY**
- Write, write, write. The importance of this cannot be overemphasized. Simply listening to the lecture, reading your text, or watching cool graphics flash by the screen is not enough. It is all too easy to lull yourself into thinking that you understand the material. Expressing your ideas clearly in writing (which is what you will have to do in the exams anyway) requires a higher level of mastery. To reach that level you must practice writing. Don't just look at the answers in the text and think you will be able to do it the same way. Write them out and perhaps seeing them on paper will provide clues as to where you might be going wrong. This will also help prevent memorization as you know how to work through the problem logically. Trust us on this. Write, write, write.
- Make the most of the resources available to you.



Where to get help for this course:

1- Instructor's office hours

2- **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, this term it is Qusai Hassan, 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.

Any announcements will be announced in class, posted on Blackboard and also at <http://ctl.utsc.utoronto.ca/home/fsg/>

3- Lab Skill Seminars (LSS)

There will be lab skills seminars throughout the term. These are run by Arany Theivendram and Sujeetha Kaneshalingam. They are booked for **Tuesday 7-8 in SY110** .Immediately after lecture. Any changes will be posted on Blackboard

The first seminar for odd numbered students will be on **Tuesday Jan 3**. They will not be recorded. Some slides will be posted before hand.

4- **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.

5- ***Extra problems sessions (called Discussion Sessions)** –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. **Monday 3-5 M 170**. Volunteer students Elizabeth Jose, Lana Kim, Harsh Malhotra and Michelle Wu will be running them.

These will begin on Jan 11th.

6- Chem Aid Centre-SW 164
<http://www.utsc.utoronto.ca/~chemaid/>

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 CHMB41 over and over. Use your text book to its fullest potential.

As soon as you are having difficulty with a problem, ask for help. We are here to help you understand organic chemistry so don't feel shy. We want you to be successful but it all starts with YOU.

We look forward to meeting you all.

Wanda and Lana

Class extra activities- 1% each for a max of 3% added to your grade after passing the course.

1. VIDEOS Lana Kim, lane.kim@mail.utoronto.ca and Michelle Wu michellekm.wu@mail.utoronto.ca

examples of a video will be found on BB

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 4 students allowed to participate in each group)**. Each group member will be rewarded with an extra credit if we approve your project. Songs must be related to the course material and be content rich. Please contact Lana Kim or Michelle before you will start working on your project. She/they 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 than 6 pm on March 24th.

A 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 Wanda or Lana in person if you will have any, it could be counted as your extra credit.

2. COURSE QUESTIONS:

**On Wanda's material (end of Chapter 16) Lana Kim, lane.kim@mail.utoronto.ca and Michelle Wu michellekm.wu@mail.utoronto.ca,
for remainder Harsh Malhotra, harsh.malhotra@mail.utoronto.ca and Liza Jose elizabeth.jose@mail.utoronto.ca**

To receive the extra credit you must provide 1 question (not taken from BRUICE) for 5 different topics in the course. Mass Spec, Infrared, NMR, Aromaticity, Reactions of Benzene, Reactions of substituted Benzenes, Carboxylic acid Derivatives, Reactions of Aldehydes and Ketones, Reactions of α , β Unsaturated Carbonyl Compounds, Amines, Reactions of Heterocyclic Compounds and Carbohydrates.

All questions submitted must include the use of ChemDraw. Each question must be submitted within a week of the completion of the topic in lecture –this means that there is no exact schedule. You must have provided 5 in total to receive the 1% credit. The will be checking for duplicates so have several that you want to submit just in case.

3. MOLECULE OF THE WEEK PROJECT -Meera Mahendiran at meera.mahendiran@mail.utoronto.ca

In general, your presentation should have information about discovery, physical and chemical properties of that molecule. You can do this project as a group (**not more than two students** allowed to participate in one group). Each of you will be given one extra mark. In general, please take a close look at the lecture material and pick some structure or structures and then try to see of how much information you can find on this structure. Please be aware that once somebody picks the topic it is not available anymore. There will be no duplication of topics. You need to get Meera's approval before you will start working on a

topic! Presentation must contain interesting and challenging material. You should submit your presentation no later than Friday, March 24th. We 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. You will be expected to make a short (up to 7 min) presentation at the end of the term in order to receive a full mark. It will be done outside the class time and no more than 10-15 people will be your audience. You should submit your ready presentation to Meera. In general, your presentation should have information about discovery, physical and chemical properties of that molecule, synthesis, and practical application. Please also try to discuss a mechanism for the reaction there its possible. Please do not forget to include references into your presentation. The best way to do it – list them as foot notes on each slide. Wikipedia will not be considered as a reference, you must look at the original paper and refer to it. These compounds must involve reactions in this part of the course. Do not choose obscure topics.

Here are some molecules which we would like to introduce to our class:

1. Aspirin (discovery, commercial method of preparation, practical application)
2. Cinnamaldehyde (natural sources, synthesis, practical application)
3. Vanillin (natural sources, synthesis, practical application)
4. Muscone (natural sources, synthesis, practical application)
5. Carvone (natural sources, synthesis, practical application)
6. Strawberry or raspberry ketones (natural sources, synthesis, practical application)
7. α -Damescone (natural sources, synthesis, practical application)
8. Z-Jasmone (natural sources, synthesis, practical application)
9. DIBAL-H (structure, importance in synthesis, usage in synthesis of natural compounds such as ciguatoxin, etc.)
10. NADH – natural reducing agent
11. α -Sinesal – structure, simple chemistry, appearance in nature.
12. Chloral hydrate (natural sources, synthesis, practical application)
13. Ninhydrin (natural sources, synthesis, practical application)
14. 2,4-Dinitrophenylhydrazine and its application in carbonyl compounds (synthesis, chemical reactions)
15. Grignard reagents (discovery, chemical properties, practical application)
16. Nicotine (natural sources, synthesis, practical application)
17. Coumarin (natural sources, synthesis, practical application)
18. D-Ribose (natural sources, synthesis, practical application)
19. Estradiol (natural sources, synthesis, practical application)
20. Anabolic Steroids (classification, synthesis, practical applications)
21. D-Glucose (natural sources, synthesis, practical application)
22. Caffeine (natural sources, synthesis, practical application)
23. Acetaminophen (synthesis, chemical properties, practical application)
24. Procaine (synthesis, chemical properties, practical application)

These are just a few ideas and we will be very happy if you will come out with your own topic.

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