



## Bio-Organic Chemistry CHMC47 2022 Course Outline

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

**Welcome to the CHMC47H3: Bio-Organic Chemistry.** This course studies the chemistry of heterocycles, nucleic acids, terpenes, steroids and other natural products; amino acids, proteins and carbohydrates; introduction to enzyme structure and catalysis; an also introduction to the chemistry of drugs.

**LEC01:** Fri 9:00-11:00 HW215 and TU 17:00-18:00 HW214 (rooms could change later, so please check the most up to date time table)

**Labs:** Mo 9:00-13:00, EV112, 113, 114, and EV122; Thur. 9:00-13:00, EV112, 113, 114. Please note that labs will be running every week. First lab will be on Monday, September 12<sup>th</sup>. **Please note that labs are compulsory with the course; you need to pass the lab component in order to pass the course!**

**Lecturer and Lab Coordinator:** Dr. Lana Mikhaylichenko

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

(416) 287-7207, EV556 or EV107 (during the lab)

**Office hours:** Tue. 3:00 – 4:00 pm, Fri. 2:00 – 3:00 pm at EV556 and during the labs (if not busy)

### Required Text Books:

P.Y. Bruice, Organic Chemistry with Study Guide and Solution Manual. 8<sup>th</sup> ed., Pearson. Alternatively you can use any edition of this book. You also need to have an access to online homework program Mastering Chemistry affiliated with this textbook.

### Recommended Websites:

Please check the External links section on the course Quercus page.

### Method of Evaluation:

**Labs: 30%** (you must pass the lab component in order to receive a final grade in this course)

**Literature Assignment: 10%** (the assignment will be given during your second lab; 2% of this mark will be assigned for the peer review)

**Midterm Test: 18%**

**Online homework: 5%**

**Oral Group Presentation: 3%** (location and time TBA)

**Final Exam: 35%** (December exam period)

**Course Website:** course site on Quercus

**Communication:** via email and office hours

### Discussion Sessions:

The discussion sessions for this class will be organized after our first lecture. I will try to find out what time and day will work for the majority of our class. This is your time to ask questions that you were not able to ask during the lecture and work together on course related problems.

### Learning Outcomes for Course:

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

- Identify, classify and name carbohydrates, amino acids, nucleic acids, and other biochemical compounds.
- Understand the principles of the chemistry connected to living systems. The principles of biosynthesis and metabolism of compounds such as: steroids, lipids, amino acids, peptides, proteins, vitamins, carbohydrates and nucleic acids.
- Use the vocabulary on organic chemicals and reactions in metabolism and other biochemical applications.
- Explain the role of enzymes in metabolism.
- Became more familiar with the modern organic techniques such as chromatography (TLC and column), separation methods (extraction, recrystallization, etc) and methods such as UV, IR,  $^1\text{H}$  NMR, GC, HPLC spectroscopy, etc.

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

Lec #	Week of	Subject	Bruice book 8 <sup>th</sup> ed.	Bruice book 6 <sup>th</sup> ed.
1	Sept 4	Carbohydrates	Ch 20	Ch 22
2	Sept 10	Carbohydrates Amino Acids	Ch 20 Ch 21	Ch 22 Ch 23
3	Sept 17	Amino Acids, Peptides, and Proteins	Ch 21	Ch 23
4	Sept 24	Lipids/Terpenes	Ch 25	Ch 27
5	Oct 1	Heterocyclic Compounds	Ch 19	Ch 21
<b>Reading week – week of October 8<sup>th</sup> (no classes)</b>				
<b>Midterm – date and location TBA</b>				
6	Oct 15	Nucleic Acids	Ch 26	Ch 28
7	Oct 22	Catalysis	Ch 22	Ch 24
8	Oct 29	The Organic Mechanisms of the Coenzymes	Ch 23	Ch 25
9	Nov 5	The Organic Mechanisms of the Coenzymes	Ch 23	Ch 25
10	Nov 12	The Chemistry of Metabolism	Ch 24	Ch 26
11	Nov 19	The Chemistry of Metabolism The Organic Chemistry of Drugs: Discovery and Design	Ch 24 Ch 31(posted on a course Quercus page)	Ch 31(posted on a course Quercus page)
12	Nov 26	The Organic Chemistry of Drugs: Discovery and Design	Ch 31(posted on a course	Ch 31(posted on a course

			Quercus page)	Quercus page)
Fall Term Exams	Dec 7 - 22	<b>Three hours term test (TBA).</b>		

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

**Lab Manual** Will be on sale through UTSC Chemistry Society during first week of classes. The introductory part of the Lab Manual has a tentative lab schedule and all the information you need to know about these labs. Please read it before coming to the actual labs. All information about upcoming lab will be also posted on course Quercus page in Lab Schedule section.

### **Oral Presentations**

Literature assignment which also contains topics for oral presentations will be posted on the Quercus page during second week of classes. The location and time for your presentations will be posted later on a Quercus course page. Please check the Quercus for the detailed explanation about this presentation. Do not worry – historically students do not like the idea about oral presentation at the beginning but really enjoy this experience at the end.

### **Literature assignment**

The detailed explanation of my expectations for the good literature assignment will be posted on a course Quercus page. We are going to use Quercus **peer review** program for the essay part of your literature assignment. Detailed instructions of how to use this program will be posted on a course Quercus page.

You will submit your literature assignment through program imbedded into Quercus assignment tool.

I will post a detailed explanation of how to submit your assignment later on a course page.

### **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 and II. I will remind you which chapter you need to review if you do not remember it well. **Keep up with the material –do not let yourself get behind!!!**

### **Class notes:**

Sets of *incomplete notes*, will be available on the class Quercus page prior to the corresponding lecture. You are responsible for working with these notes and study from the posted WebOption lectures. **You will be responsible for all material covered in lecture, even if it is not included in the online notes;** you must watch lecture in order to get additional information. Each lecture will be available on the course Quercus page for two weeks. It is your responsibility to study them.

## Steps toward Success in Bio-Organic Chemistry:

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 leaning the material much easier.
2. **Schedule your time** to study each lecture and keep up with this schedule.
3. **Do practice problems!** This is the most important and most productive way to study and ESSENTIAL to your 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.

### 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 SW302) 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 STATEMENT

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto is a strong signal of each student's individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behavior on Academic Matters (<http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>) outlines the behaviors that constitute academic dishonesty and the processes for addressing academic offences. Potential offences include, but are not limited to:

**IN PAPERS AND ASSIGNMENTS:** Using someone else's ideas or words without appropriate acknowledgement. Submitting your own work in more than one course without the permission of the instructor. Making up sources or facts. Obtaining or providing unauthorized assistance on any assignment.

**ON TESTS AND EXAMS:** Using or possessing unauthorized aids. Looking at someone else's answers during an exam or test. Misrepresenting your identity.

**IN ACADEMIC WORK:** Falsifying institutional documents or grades. Falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes.

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behavior on Academic Matters. If you have questions or concerns about what constitutes appropriate academic behavior or appropriate research and citation

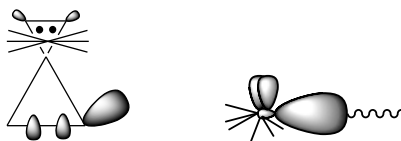
methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources (see [http://www.utoronto.ca/academicintegrity/resourcesfor\\_students.html](http://www.utoronto.ca/academicintegrity/resourcesfor_students.html)).

Please also note this:

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>

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



P.S. This picture was made for fun using ChemDraw program but it is very useful tool in organic chemistry labs. Please download it through U of T library website. It is free for U of T students and you will be using it a lot during this course. Your literature assignment must have all structures and reaction mechanisms done using this program.