

**Bio-Organic Chemistry**  
**CHMC47 2013**  
**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, and TU 17:00-18:00, SW-128

**Labs:** Mo 9:00-13:00, SW153 and SW159; Thur. 9:00-13:00, SW153. Please note that labs will be running every week. First lab will be on Monday, September 9<sup>th</sup>.

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

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

(416) 287-7207, SW-633A or SW162 (during the lab)

**Office hours:** Tue. 2:00 – 3:00 pm, Fri.1:00 – 2:00 pm and during the labs (if not busy)

**Required Text Books:**

P.Y. Bruice, Organic Chemistry with Study Guide and Solution Manual. 7<sup>th</sup> ed., Pearson.

P.Y. Bruice, *Study Guide and Solutions to Organic Chemistry*, 7<sup>th</sup> ed., Pearson

(You can also use 5<sup>th</sup> or 6<sup>th</sup> edition book and Study Guide)

**Recommended Websites:**

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

**Method of Evaluation:**

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

**Literature Assignment: 5%** (the assignment will be given during your second lab)

**Midterm Test: 20%**

**Oral Group Presentation: 5%** (location and time TBA)

**Final Exam: 40%** (December exam period)

**Course Website:** course site on Blackboard

**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.
- Become 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 6 <sup>th</sup> ed.	Bruice book 7 <sup>th</sup> ed.
1	Sept 3	Carbohydrates	Ch 22	Ch 21
2	Sept 9	Carbohydrates Amino Acids	Ch 22 Ch 23	Ch 21 Ch 22
3	Sept 16	Amino Acids, Peptides, and Proteins	Ch 23	Ch 22
4	Sept 23	Lipids/Terpenes	Ch 27	Ch 16; 25
5	Sept 30	Heterocyclic Compounds	Ch 21	Ch 20
6	Oct 7	Nucleic Acids	Ch 28	Ch 26
<b>Reading week – week of October 14<sup>th</sup> (no classes)</b>				
<b>Midterm – date and location TBA</b>				
7	Oct 21	Catalysis	Ch 24	Ch 23
8	Oct 28	The Organic Mechanisms of the Coenzymes	Ch 25	Ch 24
9	Nov 4	The Organic Mechanisms of the Coenzymes	Ch 25	Ch 24
10	Nov 11	The Chemistry of Metabolism	Ch 26	Ch 25
11	Nov 18	The Chemistry of Metabolism The Organic Chemistry of Drugs: Discovery and Design	Ch 26 Ch 31	Ch 25 See lecture notes
12	Nov 25	The Organic Chemistry of Drugs: Discovery and Design	Ch 31	See lecture notes
Fall Term Exams	Dec 7 - 21	Tree hour term test (TBA).		

Assigned problems will be posted with the every lecture material.

**Lab Manual** for this course will be sold through UTSC Chemistry Club (dates and location TBA). 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 Blackboard page in Lab Schedule section.**

### **Oral Presentations**

Literature assignment which also contains assignment for the oral presentations will be given to you during second lab period. The location and time for your presentations will be posted later on a Blackboard course page. Please check the Blackboard 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 for my expectations for the good literature assignment will be posted on a course Blackboard page. We will also have a guest lecturer who will let you know about UTSC writing centre and all the help available there. You will submit your literature assignment through Turnitin program. This is a U of T statement about this program:

**"Normally, students will be required to submit their course essays to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site".**

I will post a detailed explanation of how to submit your assignment later on a course page. Link to Turnitin program will be also posted in External Links section on a course Blackboard 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*, 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 in order to get additional information.

## 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. **Go to class.** Go to class every time and pay attention during class.
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.

### 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 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 Behaviour on Academic Matters (<http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>) outlines the behaviours 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

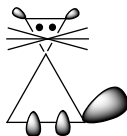
your instructor or from other institutional resources (see <http://www.utoronto.ca/academicintegrity/resourcesforstudents.html>).

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+\\$126+Budget/2012-13+Category+5+Ancillary+Fees.pdf](http://www.planningandbudget.utoronto.ca/Assets/Academic+Operations+Digital+Assets/Planning+$126+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.