Bio-Organic Chemistry
CHMC47
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, SW-143

Lecturer: Dr. Lana Mikhaylichenko
Contact: mikhay@utsc.utoronto.ca
(416) 287-7207, SW-633A

Office hours: Wed. 1:00 – 2:00 pm, Thu 1:00 – 2:00 pm, Fri. 1:00 – 3:00 pm

Required Text Books:
P.Y. Bruce, Organic Chemistry, 5th ed., Pearson.
P.Y. Bruce, *Study Guide and Solutions to Organic Chemistry*, 5th ed., Pearson
(You can also use 4th edition book and Study Guide)

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
Free chemistry drawing program:
http://www.acdlabs.com/download/chemsketch/

Method of Evaluation:
Assignment: total mark 15% ; 10% paper (November 13th) and 5% presentation (TBA)
Midterm Test: 35%
Final Exam: 50% (December exam period)

Course Website: course site on Intranet and Blackboard
Communication: via email and office hours

Discussion Section:
The discussion section for this class will be Tuesday evening from 5 -6 pm, location TBA. This is your time to ask questions that you were not able to ask during the lecture.

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.

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

Lec #	Week	Subject	Reading (Bruice 5th ed.)	Reading (Bruice 4th ed.)
1	Sept-11	**Carbohydrates**	Ch 21	Ch 22
2	Sept-18	**Carbohydrates**	Ch 21	Ch 22
3	Sept-25	**Amino Acids, Peptides, and Proteins**	Ch 22	Ch 23
4	Oct-2	**Amino Acids, Peptides, and Proteins**	Ch 22	Ch 23
5	Oct-9	**Lipids**	Ch 26	Ch 26
6	Oct-16	**Heterocyclic Compounds**	Ch 20	Ch 21
TERM TEST	120 MINS	**Around this time. Date to be announced. Chapters TBA**		
7	Oct-23	**Hucleic Acids**	Ch 27	Ch 27
8	Oct-30	**Catalysis**	Ch 23	Ch 24
9	Nov-6	**The Organic Mechanisms of the Coenzymes**	Ch 24	Ch 25
10	Nov-13	**The Organic Mechanisms of the Coenzymes** **The Chemistry of Metabolism**	Ch 24 Ch 25	Ch 25 Ch 25
	Nov-13	**Written assignment due**		
11	Nov-20	**The Chemistry of Metabolism**	Ch 25	Ch 25
12	Nov-27	**The Organic Chemistry of Drugs: Discovery and Design**	Ch 30	Ch 30
Fall Term Exams	Dec 7 -19	**Tree hour term test.**		

Assigned problems will be posted with the every lecture material.

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. **Keep up with the material –do not let yourself get behind!!!**

Class notes:

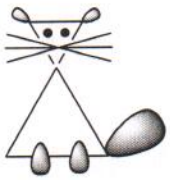
Sets of *incomplete notes*, including figures discussed in class, will be available on the class Intranet page prior to the corresponding lecture. You are responsible for printing these notes and bringing them with you to class. **You will be responsible for all material covered in lecture, even if it 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 sections.

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 Access*Ability* Services Office as soon as possible. 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.

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



C42

Course Instructor: Kagan Kerman, e-mail: kkerman@utsc.utoronto.ca
TA/ Lab coordinator: Svetlana (Lana) Mikhaylichenko,
e-mail: mikhay@utsc.utoronto.ca
Kagan's office: Room 533, Science Wing, office phone: (416) 287 - 7249
Lana's office: Room 633A, Science Wing, office phone: (416) 287 - 7207
Kagan's office hours: Friday, 1:30 - 4:00 pm or e-mail me (kkerman@utsc.utoronto.ca) for an appointment (please, suggest at least two possible times for the appointment).
Lana's office hours: Wednesday, 3-6 pm at SW159 and Thursday, 1-2 pm at SW633A.
Recommended Reading: Students are strongly encouraged to follow the lectures and the notes of the instructor for guidance in readings and problems from online chemistry journals and the following textbooks:

Advanced Organic Chemistry Part A: Structure and Mechanisms, 5th Edition, Francis A. Carey & Richard J. Sundberg, Springer.
March's Advanced Organic Chemistry: Reactions, mechanisms and structure, 6th Edition, Michael B.
Smith and Jerry March, Wiley.
Organic Chemistry, 5th Edition, Paula Yurkanis Bruice, Ace Organic Series.
These recommended readings are available online and in the UTSC Bookstore or the Reserves section of
the UTSC Library.

Course Description: Principles of synthesis organic and functional group transformations; compound chemistry, and structure elucidation. This course includes a four-hour laboratory every week. Offered in alternate years with CHMC42H.
Exclusion: CHM348H
Prerequisites: CHMB41H & CHMB42H

Course Topics:
Lecture 1. Planning Organic Syntheses: Synthons and Reagents
Lecture 2. The order of events, One group C-X disconnections, Chemoselectivity, Two-group C-X disconnections
Lecture 3. Amine synthesis, protecting groups, One group C-C disconnections: Alcohols
Lecture 4. One group C-C disconnections: Carbonyls, Alkene synthesis, Use of acetylenes
Lecture 5. Diels-Alder, Carbonyl condensations, Control in carbonyl condensations
Lecture 6. Nitro groups, Radicals, Reconnection
Lecture 7. Strategy of carbonyl disconnections, Saturated heterocycles
Lecture 8. Cyclopropanes, Rearrangements
Lecture 9. Rings, Pericyclic reactions, Ketenes
Lecture 10. Aromatic heterocycles
Lecture 11. Stereoselectivity
Lecture 12. Advanced Strategies

Course Instruction: The course will consist primarily of interactive lecture supported by tutorials and labs.
Lectures: Friday, 9:00 - 11:00 am in Science Wing, Room 143
Labs: Thursday, 8:00 - 12:00 am in Science Wing, Rooms 153 & 159

Evaluation:

Evaluation components:

Mid-term Exam 25%
Quiz 5%
Labs 35%
Final Exam 35%

Course Policies and General Information:

Course Announcements: Announcements, updates to readings, assignment topics, requirements, and evaluation, etc. will be posted to the Blacboard and Intranet sites. Students are responsible for checking the course website regularly.

Lecture/Lab Attendance: Attendance at lectures and labs is expected. Attendance is taken in labs. In the event you arrive late, check in with the Instructor. However, 20 minutes late is considered absent.

Participation: Participation in class discussions and exercises is expected. Your participation will be evaluated based on completion of assessments and grades on unannounced quizzes that will be given during lectures.

Office Hours: Students are welcome to ask questions or resolve course-related problems by contacting the Course Instructor either by dropping in during scheduled office hours or by making an appointment. Students are responsible for work missed as a result of absence; the Course Instructor will not re-teach material covered in the lectures and lab sessions.

e-mail Communication: The Course Instructor may be contacted via the course e-mail address (kkerman@utsc.utoronto.ca) to get clarification on course-related issues, to submit assignments. The Course Instructor will endeavour to provide responses to emails within 48 hours. Urgent issues must be communicated in person or by telephone (with a follow up email message).

Access*Ability*: 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 Access*Ability* Services Office as soon as possible. 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. The sooner you let us know your needs the quicker, we can assist you in achieving your learning goals in this course.

Cell Phones: During lectures and labs please turn off your cell phones to avoid disruption of the class. If circumstances warrant use of your cell phone and you must receive an emergency call, please inform the Course Instructor at the beginning of the session in advance and then excuse yourself from the session to respond to the call outside the lecture or lab.

Academic Calendar: Further information about academic regulations and course withdrawal deadlines can be found in the UTSC Calendar. You are encouraged to read this material.

Centre for Teaching and Learning: If you need assistance with effective writing skills, study skills, exam preparation, note taking, or time management, free workshops and advice are available from the Centre for Teaching and Learning, which can be reached at:
http://www.utsc.utoronto.ca/~ctl/Student_Support/index.html

Computer Use: Ethical use of University computers is expected at the University of Toronto at Scarborough. Guidelines are set out in the UTSC Calendar. It is expected that the equipment and/or resources accessed in the UTSC Library and the computer labs are to be used for academic research, assignments, and course activities only.

Academic Integrity: Honesty and fairness are considered fundamental to the University's mission, and, as a result, all those who violate those principles are dealt with as if they were damaging the integrity of the University itself. When students are suspected of cheating or a similar academic offence, they are typically surprised at how formally and seriously the matter is dealt with - and

how severe the consequences can be if it is determined that cheating did occur. The University of Toronto treats cases of cheating and plagiarism very seriously.

Examples of offences for which you will be penalized include (but are not limited to):

- Using any unauthorized aids on an exam or test (e.g., "cheat sheets")
- Representing someone else's work or words as your own - plagiarism (see web document "How not to plagiarize" available online at http://www.utoronto.ca/writing/plagsep.html
- Falsifying documents or grades
- Purchasing an essay
- Submitting someone else's work as your own
- Submitting the same essay or report in more than one course (without permission)
- Looking at someone else's answers during an exam or test
- Impersonating another person at an exam or test or having someone else impersonate you
- Making up sources or facts for an essay or report.

As a student it is your responsibility to ensure the integrity of your work and to understand what constitutes an academic offence. If you have any concerns that you may be crossing the line, please, read from the website http://www.utoronto.ca/academicintegrity/resourcesforstudents.html and always consult your instructor. Your instructor can explain, for example, the nuances of plagiarism and how to use secondary sources appropriately; he or she will also tell you what kinds of aids - calculators, dictionaries, etc. - are permitted in a test or exam. Ignorance of the rules does not excuse cheating or plagiarism. This information is taken from the brochure, "Academic Integrity" and website, part of a series of UofT publications to help students understand the University's rules and decision making structures. For copies, visit the Office of the Registrar at UTSC. All of the policies and procedures surrounding academic offences are dealt with in one policy: "The Code of Behaviour on Academic Matters". The full text is located in the back of the UTSC Calendar.