

CHEM*4740 TOPICS IN BIO-ORGANIC CHEMISTRY
Fall Semester 2015

GENERAL INFORMATION AND COURSE OUTLINE

Instructor:

Adrian L. Schwan MacN 336 X58781

Office Hours: Monday, Wednesday 3:30 – 6:00 pm
 Tuesday, 1:30 – 3:00 pm
 Thursday, Friday 9:30 – 11:30 am

Prerequisites:

Chem*3750 Organic Chemistry II Chem*2580 Introductory Biochemistry

The course instructor will assume a working knowledge of the content of the prerequisites and other preceding courses. Please review old notes as required.

Text: There is no text for this course. The course instructor will provide references as required by way of CourseLink and the library reserve desk. Course will be available for some chapters. Templates will be made available when possible. References are distributed liberally throughout the course notes

Method of Presentation There are three meetings each week (Mon. Wed. Fri. 8:30-9:20 in Powell 212). The Oct. 14/15 lecture is cancelled.

This course provides students will general and specific aspects of selected key areas in bio-organic chemistry.

1. Fundamentals of the Biosynthesis of Natural Products
2. Fundamentals of Phospholipids
3. Synthetic Approaches to Phospholipids
4. Enzymes in Organic Chemistry
5. An Introduction to Aspects of Medicinal Chemistry

Course Grade: The final grade will be calculated as follows:

| Item | Value | Comments/Details |
|-------------------|--------------|--|
| Assigned Problems | 20% | #1 available Sept. 14, due Mon. Oct. 5 (15%) #2 available Sept. 28, due Fri. Oct. 16 (5%) |
| Class Test | 20% | Wed. Oct. 28 in class |
| Essay | 30% | -on medicinal chemistry, details to follow, due Mon. Nov. 30 |
| Final examination | 30% | Dec. 8, evening |

Specific Course Content

Biosynthesis of Natural Products. general principles, sources of atoms and molecule fragments; biosynthetic routes to acetogenins, alkaloids, terpenes & fatty acids; isotope labelling methods for elucidation of biosynthetic routes

Phospholipids structures of fatty acids; various phosphorus head groups; physical characteristics; synthetic methods; lipases, cellular 2nd messengers; lung surfactant therapy

Synthetic Approaches to Phospholipids common starting materials, pitfalls, protecting group strategies, ether phospholipids, phosphorylation methods

Enzymes in Organic Chemistry modes of stereochemistry, uses of lipases, directed evolution of enzymes for selectivity

An Introduction to Aspects of Medicinal Chemistry ADMET principles, functional groups and their properties, common structural changes to enhance drug activity, review of some drug development histories

Visiting Speakers

Dr. Yongxin Han, Merck Research Laboratories, Boston, MA, Nov. 16 (tentative)

Dr. Allan Rey, Merck PharmaChem, Brantford, ON, Nov. 27

Course Objectives

-to learn and recognize the fundamental fragments and reactions leading to the biosynthesis of various families of natural products; -to apply these principles in suggesting how certain natural products are formed

-to learn and demonstrate familiarity with phospholipid and fatty acid chemical structures and the available hydrolyzable bonds of those structures

-to outline simple and effective laboratory syntheses of phospholipids from simple chemical structures

-to understand and recognize opportunities for lipase enzymes to act on organic molecules and deliver enantioenriched organic products

-to learn some of the fundamental aspects of medicinal chemistry, particularly those involving chemical structure features and adaptations required to optimize drug activity

-effectively understand and communicate the numerous considerations involved between drug lead discovery and bringing a drug to market.

E-mail Communication

As per university regulations, all students are required to check their <mail.uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. [See the undergraduate calendar for information on regulations and procedures for Academic Consideration.](#)

Drop Date

The last date to drop one-semester courses, without academic penalty, is **Friday, November 6, 2015**. For [regulations and procedures for Dropping Courses, see the Undergraduate Calendar.](#)

Copies of out-of-class assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Student Accessibility Services as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: <http://www.uoguelph.ca/csd/>

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

[The Academic Misconduct Policy is detailed in the Undergraduate Calendar.](#)

Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Resources

The [Academic Calendars](#) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.