

**INFORMATION SHEET AND COURSE OUTLINE
ADVANCED CARBOHYDRATE CHEMISTRY, CHEM*7600/760
FALL SEMESTER, 2017**

1. INSTRUCTOR

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➤ NOTE: This course is combined with an undergraduate course Chem*4740 however the following information is SPECIFIC to students enrolled into the graduate course Chem*7600/760.

➤ Email: fauzanne@uoguelph.ca. Last minute information may be sent to you by email, make sure that you retrieve your mail regularly.

2. LECTURE LOCATION:

Mon, Wed, Fri: 8:30AM - 9:20AM; MCKN, Room 225

3. TEXTBOOKS AND SUPPLEMENTARY MATERIAL

There is no "official" text-book for this course. However the lecture content will be based on the following texts as well as literature examples:

1. Title: Organic synthesis with carbohydrates
Author: Boons, Geert-Jan. Hale, Karl.
Publisher: Malden, MA: Blackwell Science, 2000.

2. Title: Essentials of carbohydrate chemistry and biochemistry
Author: Lindhorst, Thisbe K.
Publisher: Weinheim : Wiley-VCH, c2003.

Additional resources are:

Title: Preparative carbohydrate chemistry
Author: Hanessian, Stephen.
Publisher: New York : Marcel Dekker, c1997.

Title: Modern Methods in Carbohydrate Synthesis
Authors: Shaheer H. Khan, Roger A. O'Neill
Publisher: Harwood Academic publishers

Title: Carbohydrates in chemistry and biology
Authors: Ernst, Beat Hart, Gerald W, Sinaÿ, Pierre
Publisher: Weinheim ; New York : Wiley-VCH, c2000.

Other resources such as pdf files of literature articles as well as lecture material will be available for download from the course web-page throughout the semester.

4. LECTURES

Depending on the number of students enrolled in the course we will have between 15-16 plain lectures, one session for a mid-term and 6 to 7 sessions during which students will give a presentation.

5. MARK DISTRIBUTION

Grades will be calculated as follow:

- Presentation: 10%
- Research proposal: 15%
- NMR practice: 5%
- MidTerm: 35%
- Final: 35%

NMR practice: This will be based on "real" set of NMR data.

Presentation and Research Proposal:

Each student will search the glycobiology literature and design an original research project. Such project could be aimed towards the synthesis of molecules relevant to glycobiology, method development for synthetic carbohydrate chemistry etc... You will write up this research proposal in an NSERC format, including Background/Relevance, descriptive short term goals, long term goals and impact. You will also be asked to provide an appropriate budget. We will have one extra meeting to discuss grant proposal writing.

Each student will present his/her proposal in class (10 min), outlining the topic of the study, and the method proposed (with details). The presentation will be followed by a 3 min discussion in class. Graduate students will present towards the last scheduled class times

6. COURSE OUTLINE AND TOPICS COVERED

1. Structure of monosaccharides: configurations, ring size, conformations, mutarotation, anomeric effect
2. Biological relevance of carbohydrates: disaccharides, oligosaccharides, polysaccharides, biosynthesis and synthetic biochemical tools
3. Carbohydrate Synthetic Chemistry: A. Protecting groups in carbohydrate chemistry and synthetic strategies: Alkyls, acyls, silyls, acetals and ketals, selectivity etc... The daunting task of multi-step carbohydrate synthesis! B. The glycosylation reaction: when titans collide, the challenge of carbohydrate chemistry. Principle of glycosylation, armed-disarmed glycosyl donors, participating groups, anomeric effect and kinetic anomeric effect, glycosylation methods: Fisher, Koenigs-Knorr, Helferich, thioglycosides, trichloroacetimidates and many others...
4. NMR of carbohydrates: chemical shifts, coupling constants, 1D, 2D (real life examples)

7. CHEM*7600: Learning Objectives

Chemistry CHEM*7600 is a one-semester course in covering the chemistry and biological chemistry of carbohydrates. This course will apply concepts learned in Chem*2700 and Chem*3750 to carbohydrate molecules and cannot be taken if the student has already taken Chem*4740 with Prof Auzanneau in a previous offering.

Specific Learning Objectives:

1. To learn about the structural fundamentals of carbohydrates.
2. To learn the basic biological importance of oligo-and polysaccharides.
3. To learn fundamentals concepts of synthetic carbohydrate chemistry and to be able to design syntheses of organic molecules of moderate complexity.
4. To learn then be able to use one dimension and two dimension NMR experiments to characterize synthetic molecules.
5. To be able to survey the literature and identify a question that has yet to be answered in the area of glycobiology.
6. To design a sound research proposal that would allow answering the question identified
7. To learn the basic skills required to write a Grant proposal in the NSERC format.
8. To concisely present the proposed research orally to a mixed audience.

STATEMENTS

E-mail Communication

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

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:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

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.

Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied.

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 in writing, with your name, id#, and e-mail contact. See the undergraduate calendar for information on regulations and procedures for Academic

Consideration: <http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Drop Date

The last date to drop one-semester courses, without academic penalty, is **Friday, Nov 3**. For regulations and procedures for Dropping Courses, see the Undergraduate Calendar:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

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 Student Accessibility Services (SAS) as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 56208 or email

accessibility@uoguelph.ca or see the website: <https://wellness.uoguelph.ca/accessibility/>

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:

<http://www.uoguelph.ca/registrar/calendars/index.cfm?index>