CHEM*4730 Synthetic Organic Chemistry

Fall 2019
Section(s): C01

Department of Chemistry
Credit Weight: 0.50
Version 1.00 - September 05, 2019

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1 Course Details

1.1 Calendar Description

This course provides an introduction to synthetic organic chemistry, including discussion of retrosynthetic analysis, modern synthetic methods, organic reaction, and syntheses of natural products. The integration of these topics for the rational design of synthetic schemes will also be discussed.

Pre-Requisites: CHEM*3750

1.2 Course Description

CHEM*4730 is an advanced Organic Synthesis course at the undergraduate level. In CHEM*4730, the emphasis is on the understanding of the factors that control reactions and the reaction products, and design syntheses of organic molecules of moderate complexity.

1.3 Timetable

MWF, 09:30 to 10:30 am, MCKN 238

1.4 Final Exam

The CHEM*4730 Final Exam is scheduled for Dec. 10, 2019, 17:00 to 19:00. Room tba.

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2 Instructional Support

2.1 Instructional Support Team

Instructor: Adrian Schwan
Email: schwan@uoguelph.ca
Telephone: +1-519-824-4120 x58781
Office: MACN 350

Office Hours: The email is provided for logistic communication. Adrian

Schwan does not discuss science by email. Person-to-person communication is infinitely more effective.

Office Hours will be announced early in the term.

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3 Learning Resources

3.1 Required Resources

Courselink (Website)

You can access the course website through Courselink: https://courselink.uoguelph.ca/shared/login/login.html.

This web page will be updated regularly. Content will include pages from lectures and other resources, as well as exam guides. Please visit this website regularly, especially to see your weekly homework responsibilities.

3.2 Recommended Resources

several resource websites will be provided on CourseLink (Website)

It is assumed that students are familiar with the organic chemistry materials covered in CHEM*2700 and CHEM*3750 in addition to fundamental chemistry concepts from other course courses. You may wish to have these notes available to review topic as needed.

Useful General Reference Books (Textbook)

A number of books and resources are made available on the Reserve Desk for short term check out. Some include:

(a) “Advanced Organic Chemistry, Part A and Part B”, 4th or 5th Ed., by Carey, F. A. and Sundberg, R. J., Kluwer Academic/Plenum Publishers (4th Ed.) or Springer Publishers (5th Ed.).

(b) “Organic Synthesis”, 2nd Edition, by Smith, M. B., McGraw-Hill Companies, Inc., New York, 2002.

(c) “March’s Advanced Organic Chemistry”, 5th or 6th Ed., by Smith M. B. and March, J., John Wiley and Sons, Inc., New York, 2001 and 2007.

(d) “Classics in Total Synthesis”, by Nicolaou, K. C. and Sorensen, E. J., VCH Publishers, Inc., New York, 1996.

(e) “The Logic of Chemical Synthesis”, by Corey, E. J. and Cheng, X. M., John Wiley and Sons, Inc., New York, 1989.

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4 Learning Outcomes

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. To understand and recognize the applications of concepts in organic synthesis.
2. To understand the consequences (reactivity, properties) of different functional groups
3. To be able to recognize and interpret patterns of reactivity on the basis of mechanistic reasoning.
4. To be able to design syntheses of organic molecules of moderate complexity.
5. To be able to explain and justify reaction steps as part of a synthesis or a reaction mechanism.
6. To be able to recognize and suggest positions for molecule assembly and bond making processes when presented with a natural product or drug.

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5 Teaching and Learning Activities

5.1 Lecture

Topics:

The lecture content will be based on 6 syntheses.

The natural products are:

1. Reserpine
2. Monensin
3. Daphnilactone A
4. Allocolchicine

The drugs are:

1. Merestinib
2. Aliskiren

Additional reactions, details, concepts and information will be discussed based on the chemistry utilized in

these syntheses.

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6 Assessments

Success in organic chemistry requires recognition of reactivity and reactive potential within organic molecules. Once that is established, possible reagents can be evaluated and eventually chosen to effect a given chemical transformation and execute a synthesis.

To Adrian Schwan, the challenge is more often in the inspection and assessment of the molecule and less frequently in the selection of the reagent. As such this course will be presented to ensure the student can inspect a molecule and assess its reactive modes, based on its chemical structure.

This course will involve the professor relating numerous aspects of selected chemical syntheses to the students. Some commonly used protocols and concepts will be expanded upon in lecture and/or assigned as homework for the students. This will occur in Monday and Wednesday lectures. In Friday lectures, students will the evaluated on their understanding of their assigned homework, by way of class engagement through discussion. Professor Schwan will coach students on how to employ established fundamental chemical principles and past course content to guide their understanding and recognition of the content under study in the course.

6.1 Marking Schemes & Distributions

If you missed an exam or a quiz, or did not hand in your assignment by the due date, you will obtain a 0% on that component, unless for special reasons like medical issues or compassionate reasons which had been communicated with me before the exam/quiz or due date.

Students who write the Early quiz are welcome to drop their grade and make their final exam worth 40%. Students must inform Prof. Schwan in writing or by email by the last lecture if they choose to exercise this option (Grading Scheme B).

Name	Scheme A (%)	Scheme B (%)
Early Quiz	5	0
Evaluation of preparedness for Friday tutorial discussions	15	15

Name	Scheme A (%)	Scheme B (%)
Mechanism Assignments	25	25
Class Test	20	20
Final Exam	35	40
Total	100	100

6.2 Assessment Details

Early Quiz (5%)
Date: Mon, Sep 16, 9:30 AM - 10:00 AM, MCKN 238
This is a 5% quiz to evaluate how you have understood and can recognize and apply past (organic) chemistry principles.

Evaluation of preparedness for Friday tutorial discussions (15%)
Date: most Friday lecture periods, MCKN 238
Students are expected to defend their homework submissions a) at the blackboard or b) from their chair when Professor Schwan puts their homework contribution on the screen.

Mechanism Assignments (25%)
Date: 8-9 per semester
Specific content will be assigned about 1 week before the deadline. Students can search available literature resources for the required material. The homework submissions are to be developed and submitted individually. Any submissions that merit investigation under the University's policy on academic misconduct could lead to penalty for the student(s) involved.

Class Test (20%)
Date: Wed, Nov 6, 9:30 AM - 10:20 AM, MCKN 238

Final Exam (35%)

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7 Course Statements

7.1 Communications

The primary communication between the students and the lecturer concerning issues with the course is through discussions during the lectures. Announcements and information related to the course, including homework responsibilities will also be available on online.

Students are expected to attend EVERY lecture. Copies of course notes have diminishing value if not obtained in the current context of Prof. Schwan's lecturing. Expectation for students' understanding of chemistry will be based on the verbal content of lectures and tutorials.

7.2 Important information for students registered with Student Accessibility Services (SAS)

(1) If you plan to write any examination at SAS, please arrange with SAS ASAP.

(2) Please send me an e-mail ASAP to inform me that you will be writing exams at SAS.

8 University Statements

8.1 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. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Graduate Calendar - Grounds for Academic Consideration
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions
https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml

8.2 Email Communication

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

8.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Graduate Calendar - Registration Changes
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml

Associate Diploma Calendar - Dropping Courses

https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml

8.4 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.

8.5 Academic Integrity

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 encourages academic integrity. 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.

Undergraduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Graduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

8.6 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance and not later than the 40th Class Day.

For Guelph students, information can be found on the SAS website
https://www.uoguelph.ca/sas

For Ridgetown students, information can be found on the Ridgetown SAS website
https://www.ridgetownc.com/services/accessibilityservices.cfm

8.7 Recording of Materials

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

8.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars
https://www.uoguelph.ca/academics/calendars
