

Advanced Organic Chemistry Laboratory (CHMD92H)
Summer 2015
University of Toronto at Scarborough

This document contains important course information and should be kept in a safe place where you can refer to it throughout the term.

Welcome to CHMD92! This lab course will build on your previously learned organic chemistry lab skills and expose you to some of the modern synthetic methods required to carry out original research. The course will consist of two, six-hour labs per week and will be divided into units, each spanning several lab periods. Through these short research projects, you will be exposed to the art of multistep synthesis pertaining to the chemistry of pharmaceutically active agents and naturally occurring substances, as well some aspects of organometallic chemistry and its applications to catalysis in organic synthesis. Prerequisites for this course include CHMB31 and one of either CHMC41 or CHMC42; CHMC31 is also recommended.

Lab Schedule:

Tuesdays and Thursdays, 10-4 pm in SW159

Instructors:

Dr. Lana Mikhaylichenko (Weeks 1-6)
Email: mikhay@utsc.utoronto.ca
Office Hours: Wednesdays 2-4 pm in SW633A

Prof. Bernie Kraatz (Weeks 7-12)
Email: bernie.kraatz@utoronto.ca
Office Hours: Tuesday and Thursday 5-6 pm in SW647A

Learning Outcomes:

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

- Plan and execute both single step and multistep organic syntheses following procedures published in the primary literature.
- Analyze practical data and write accurate and complete scientific reports disseminating your findings.
- Use the vocabulary of organic chemicals, reactions and techniques found in modern chemistry labs.
- Troubleshoot practical mistakes and propose solutions to problems encountered during an experiment.
- Carry out modern laboratory techniques such as: setting up reactions under an inert atmosphere, determining reaction yields using an internal standard.

- Became more familiar with modern organic chemistry instruments, such as HPLC, GC, GC-MS, and MNR.
- Analyze spectroscopic data for both known and unknown organic structures, including mixtures of substances.

Website:

CHMD92 maintains a Blackboard page which archives a variety of course-related information including: including pre-lab assignments, synthetic procedures, references and links to outside resources. In addition, class emails will regularly be sent via Blackboard. In order for you to receive these emails, you must have a valid "utoronto.ca" email account registered with ROSI.

Lab Schedule (tentative):

| Lab # | Date | Lab Topic |
|-------|------------|---|
| 1 | May 5 | Introduction to the first part of the course; library assignment. |
| 2 | May 7 | Synthesis of substituted Stilbenes via Wittig reaction. |
| 3 | May 12 | Multistep synthesis of an Acyl Pyrazolidinones. |
| 4 | May 14 | |
| 5 | May 19 | |
| 6 | May 21 | |
| 7 | May 26 | 1,3,5-Triazine Module: Synthesis of 1,3,5-triazine derivatives as precursors for the synthesis of new compounds with potential bioactivity to inhibit serine hydrolase. |
| 8 | May 28 | |
| 9 | June 2 | |
| 10 | June 4 | |
| 11 | June 9 | |
| 12 | June 11 | |
| | June 16&18 | Reading week |
| 13 | June 23 | Library assignment; synthesis of ferrocene carboxylic and ferrocene dicarboxylic acid from ferrocene. |
| 14 | June 25 | |
| 15 | June 30 | Synthesis of ferrocene carboxylic acid |
| 16 | July 2 | |
| 17 | July 7 | |
| 18 | July 9 | Synthesis of ferrocene dicarboxylic acid |
| 19 | July 14 | |
| 20 | July 16 | |
| 21 | July 21 | |
| 22 | July 23 | |
| 23 | July 28 | |
| | July 30 | Presentations |

Lab Manual:

There is no lab manual for this course. All required documents will be posted on Blackboard as needed.

Textbook:

There is no required text for this course; however, the following book is recommended and is on reserve in the library:

- Microscale Organic Laboratory with Multistep and Multiscale Synthesis, Dana W. Mayo, Ronald M. Pike, David C. Forbes., 5th ed., Wiley

Recommended Websites:

The following websites may be of use to you while preparing for new experiments and writing your formal reports, these links will be also posted on a Blackboard course web-page:

- 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>
- Access to a free copy of ChemDraw – a chemistry drawing software
https://login.library.utoronto.ca/cgi-bin/go_log.pl?url=http://www.chem.utoronto.ca/library/reg.php
- Proton chemical shifts
<http://www.chem.wisc.edu/areas/reich/handouts/nmr-h/hdata.htm>
- Not Voodoo – a site devoted to demystifying the organic chemistry techniques
<http://chem.chem.rochester.edu/~nvd/>
- Video on some simple laboratory techniques
<http://webapps.utsc.utoronto.ca/chemistryonline/solubility.html>

Method of Evaluation:

Your grade in this course will be determined as follows:

| Graded Item | Weight | Comments |
|-------------------|--------|---|
| Lab Performance | 30% | Includes pre-lab assignments, notebooks, products, performance in the lab |
| Lab Reports | 60% | Four reports, each worth 15% |
| Oral presentation | 10% | Location and time TBA |

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.

Academic Integrity:

Academic integrity is one of the cornerstones of the University of Toronto. It is critically important both to maintain our community which honours the values of honesty, trust, respect, fairness and responsibility and to protect you, the students within this community, and the value of the degree towards which you are all working so diligently.

According to Section B of the University of Toronto's Code of Behaviour on Academic Matters

<http://www.governingcouncil.utoronto.ca/policies/behaveac.htm> which all students are expected to know and respect, it is an offence for students to:

- To use someone else's ideas or words in their own work without acknowledging that those ideas/words are not their own with a citation and quotation marks, i.e. to commit plagiarism.
- To include false, misleading or concocted citations in their work.
- To obtain unauthorized assistance on any assignment.
- To provide unauthorized assistance to another student. This includes showing another student completed work.
- To submit their own work for credit in more than one course without the permission of the instructor.
- To falsify or alter any documentation required by the University. This includes, but is not limited to, doctor's notes.
- To use or possess an unauthorized aid in any test or exam.

There are other offences covered under the Code, but these are by far the most common. Please respect these rules and the values which they protect. Offences against academic integrity will be dealt with according to the procedures outlined in the Code of Behavior on Academic Matters.

Turnitin.com:

Please note that this course will be using Turnitin.com for all papers and presentation. Students will be required to submit their course work 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.