

Advanced Organic Chemistry Laboratory (CHMD92H) – Summer 2013

University of Toronto at Scarborough

(tentative)

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 6-hour labs per week and will be divided into two units, each spanning several lab periods. Through these short research projects, you will be exposed to the art of chemical synthesis, which enable access to different structures with different functions. In order to reach the synthetic targets, a variety of skills and techniques, including experimental design, reaction monitoring, product purification, structural characterization and reaction optimization, are required and will be strategically combined in this course. Prerequisites for this course include at least one of either CHMC41, CHMC42 or CHMC31.

Lab Schedule:

Tuesdays and Thursdays, 10-4 pm in SW159

Instructors:

Prof. Heinz-Bernhard Kraatz (**Week 1-6**)

Email: bernie.kraatz@utoronto.ca

Office Hours: Tuesdays and Thursdays 5-6 pm in SW647

Prof. Xiao-an Zhang (**Week 7-12**)

Email: xazhang@utsc.utoronto.ca

Office Hours: Tuesdays and Thursdays 5-6 pm in SW511

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 provided.
- Operate different instruments to obtain the analytical data for reaction monitoring or intermediate/product analysis.
- Use the scientific terms and vocabulary of organic chemicals, reactions and techniques found in modern chemistry labs.
- Search literature to study the project background and to look for possible solutions for practical problems.
- Analyze practical data and write accurate and complete scientific reports disseminating your findings.
- Troubleshoot practical mistakes and propose solutions to problems encountered during an experiment.
- Carry out modern laboratory techniques such as: setting up reactions at different scales and under different conditions (i.e. oxygen-free), monitoring the reaction process, detecting the intermediate or side product, determining reaction yields.
- Analyze a variety of spectroscopic data for both known and unknown organic structures, including mixtures of substances.

Website:

CHMD89 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.

Course Contents:

	Period	Research Topic
Part I	Week 1-6	Synthesis of Ferrocene Derivatives
Part II	Week 7-12	Synthesis of Porphyrin Derivatives

Lab Manual:

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

Reference book:

There is no required text for this course; however, the following books are recommended and are available in the library:

- Mayo, D. W.; Pike, R. M.; Forbes, D. C. *Microscale Organic Laboratory with Multistep and Multiscale Synthesis*, 5th ed.; Wiley: Hoboken, NJ, 2011.
- Dean, J. R.; Jones, A. M.; Holmes, D.; Reed, R.; Jones, A.; Weyers, J. *Practical Skills in Organic Chemistry*, 2nd ed.; Pearson: Harlow, England, 2011.

Recommended Websites:

The following websites may be of use to you while preparing for new experiments and writing your formal reports:

- 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
- Not Voodoo – a site devoted to demystifying the organic chemistry techniques
<http://chem.chem.rochester.edu/~nvd/>
- Proton chemical shifts
<http://www.chem.wisc.edu/areas/reich/handouts/nmr-h/hdata.htm>
- Video on some simple laboratory techniques
<http://webapps.utsch.utoronto.ca/chemistryonline/>
- 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>

Method of Evaluation:

Your grade in this course will be determined as follows:

Graded Item	Weight	Comments
In Lab Performance	15%	Includes pre-lab preparation, laboratory work-habits, practical skills, products, etc
Quizzes and Participations	10%	Four in-lab quizzes: questionnaires and tests related to material discussed in lab
Lab Reports	20%	Lab journal record
Final Report	45%	Thesis writing
Final presentation	10%	Presentation on topic related to one of the lab modules; topic will be assigned

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 Behaviour on Academic Matters.