

# Advanced Organic Chemistry Laboratory (CHMD92H) – Summer 2012

## University of Toronto at Scarborough

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**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 at least one of either CHMC41, CHMC42 or CHMC31.

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

### ***Lab Schedule:***

Tuesdays and Thursdays, 10-4 pm in SW159

### ***Instructors:***

Dr. Lana Mikhaylichenko (Weeks 1-6)

Email: [mikhay@utsc.utoronto.ca](mailto:mikhay@utsc.utoronto.ca)

Office Hours: Wednesdays 2-4 pm in SW633A

Dr. Effie Sauer (Weeks 7-12)

Email: [esauer@utsc.utoronto.ca](mailto:esauer@utsc.utoronto.ca)

Office Hours: Mondays and Wednesdays 3-4 pm in SW640

### ***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.
- Analyze 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 Schedule (tentative):**

Date	Lab Topic
May 15th	Multistep synthesis of caffeic acid phenethyl ester (CAPE), a potent 5-lipoxygenase inhibitor from honeybee hives.
May 17th	Pyridine Module: Synthesis of pyridine derivatives with potential bioactivity as potential fibrillogenesis inhibitors of A $\beta$ -42 peptide.
May 22nd	
May 24th	
May 29th	
May 31st	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.
June 5th	
June 7th	
June 12th	
June 14th	
June 19th	Sunscreen Module: Synthesis of new UVA and UVB absorbing agents
June 21st	
July 3rd	
July 5th	
July 10th	Porphyrin Catalysis Module: Synthesis of manganese porphyrin catalysts and their use as a biomimetic catalysts for dehydrogenation reactions
July 12th	
July 17th	
July 19th	
July 24th	
July 26th	-----
July 31 <sup>st</sup>	
August 2nd	Class 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 books are recommended and are on reserve in the library:

- Mayo, D. W.; Pike, R. M.; Forbes, D. C. *Microscale Organic Laboratory with Multistep and Multiscale Synthesis*, 5<sup>th</sup> ed.; Wiley: Hoboken, NJ, 2011.
- Dean, J. R.; Jones, A. M.; Holmes, D.; Reed, R.; Jones, A.; Weyers, J. *Practical Skills in Organic Chemistry*, 2<sup>nd</sup> 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](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.utsc.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
Assignments	15%	Five short assignments worth 3% each; one for each lab module
Quizzes	5%	One quiz per lab module worth 1% each
Lab Performance	20%	Includes pre-lab preparation, notebook grade, products, laboratory work-habits
Lab Reports	50%	Four reports, each worth 12.5%
End-of-term 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](mailto: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.

***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.