

# **CHM 1488: CURRENT DIRECTIONS IN EXPERIMENTAL PHYSICAL CHEMISTRY**

## **Fall 2020 Course Syllabus**

### **I TEACHING TEAM**

---



#### **INSTRUCTOR (Weeks 1 – 4 and weeks 9 - END)**

Name: Professor Al-Amin Dhirani  
Email: [a.dhirani@utoronto.ca](mailto:a.dhirani@utoronto.ca)  
Research: [dhiranilab.wordpress.com](http://dhiranilab.wordpress.com/)  
Online student hours: by appointment



#### **INSTRUCTOR (Weeks 5 – 8 and weeks 9 - END)**

Name: Professor Cynthia Goh  
Email: [cynthia.goh@utoronto.ca](mailto:cynthia.goh@utoronto.ca)  
Research: <http://www.gohlab.com/>  
Online student hours: by appointment

### **II COURSE OVERVIEW**

---

Welcome to **CHM1488H Current Directions in Experimental Physical Chemistry!**

This is obviously a huge subject, much too large to cover in a single course (indeed, even in a lifetime). At the same time, it is a very active area with significant opportunities to advance the frontiers of knowledge: energy storage, cleaning our environment including our water and air, developing advanced materials that kill harmful bacteria and viruses are just a few examples.

So, how should one start?

This course will provide a hands-on introduction to this subject and some practice by

- 1) discussing some important fundamental principles and techniques commonly used in experimental physical chemistry (e.g. electronics and optics);
- 2) giving you hands-on practice exercises (including an introduction to programming and data acquisition); and
- 3) providing you with an opportunity to design and conduct an experiment. (We will spare you the steps relating to raising funding!)

Both instructors enjoy applying physical principles and experimental methods / apparatus to solve interesting and useful problems. We hope to share that sense with all students in this course.

**PREREQUISITE COURSE(S):**

This course assumes you have a fundamental understanding of undergraduate physical chemistry and 1<sup>st</sup> year calculus.

**REFERENCE MATERIAL:**

There is no required textbook for this course. For the electronics related portions of the course, “*The Art of Electronics*” by Horowitz and Hill is useful reference for extra reading. The classic book for anyone attempting to build scientific apparatus is “*Building Scientific Apparatus*” by JH Moore et al., and even more classic is E. Bright Wilson’s “*An Introduction to Scientific Research*” available as a Dover edition. It’s a little bit dated (it was written in 1952 after all) but covers everything a researcher should know! None of these are textbooks but would make for excellent education!

---

**III HOW THE COURSE IS ORGANIZED**

CHM 1488 has three sections that conceptually overlap:

- 1) fundamental of electronics and an introduction to data acquisition and programming (weeks 1 – 4);
- 2) optics and experimental design (weeks 5 – 9); and
- 3) a student-led experiment (weeks 10 – term end).

Although the student – led experiment formally begins in week 10, students should start their literature search earlier and complete ordering materials/components so that they arrive by week 10. Students will be given kits at the start of term to practice/extend concepts learned in classes and to use as needed to conduct their own experiment.

**CLASSES:**

Classes will be live-streamed on Tuesdays 4-6 EST, and additionally recorded for students who are unable to attend live. It is essential that you attend the live classes and/or review the recordings afterwards in order to solidify your understanding of the fundamental course material.

**IMPORTANT FALL 2020 SESSIONAL DATES:**

First Day of F & Y classes: Tuesday 15<sup>th</sup> September 2020

Thanksgiving (no classes): Monday 12<sup>th</sup> October 2020

Fall Reading Week (no classes): Monday 9<sup>th</sup> – Friday 13<sup>th</sup> November 2020

Last Day of classes: Tuesday 8<sup>th</sup> December 2020

---

**IV EVALUATION/GRADE SCHEME**

Homeworks: 80%

Student-led experiment presentation: 20%

---

**V COURSE POLICIES**

- Course website: [g.utoronto.ca](http://g.utoronto.ca)

**Important: please check the Quercus course website regularly (weekly!) for:**

- ✓ general course information
- ✓ lectures
- ✓ important announcements
- Email will generally be responded to if: (1) You send it from your utoronto.ca account; (2) You identify yourself in the e-mail subject as a student in CHM 1488 and include your name and University of Toronto student ID number. Please note that chemistry can be discussed through an online discussion arranged by appointment much more effectively than by email, and that email is not a substitute for attending classes.
- The University of Toronto is committed to equity, human rights and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect where all members of our community can express themselves, engage with each other, and respect one another's differences. U of T does not condone discrimination or harassment against any persons or communities.
- Aspects of this course, including your participation, will be recorded on video and will be available to students in the course for viewing remotely and after each session. Course videos and materials belong to your instructor, the University, and/or other sources depending on the specific facts of each situation and are protected by copyright: for questions about recording and use of videos in which you appear please contact your instructor. Students may not create audio recordings of classes with the exception of those students requiring an accommodation for a disability, who should speak to the instructor prior to beginning to record lectures. Students creating unauthorized audio recording of lectures violate an instructor's intellectual property rights and the Canadian Copyright Act. Students violating this agreement will be subject to disciplinary actions under the Code of Student Conduct. Course videos may not be reproduced or posted or shared anywhere other than the official CHM 1488 Quercus site and should only be used by students currently registered in the course. Recordings may be saved to students' laptop for personal use. Because recordings will be provided for all classes, students may not create additional audio or video recordings without written permission from the instructor. Permission for such recordings will not be withheld for students with accommodation needs.

## **VI TECHNOLOGY REQUIREMENTS**

---

- This course requires the use of computers, and unfortunately sometimes things can go wrong when using them. You are responsible for ensuring that you maintain regular backup copies of your files, use antivirus software (if using your own computer), and schedule enough time when completing an assignment to allow for delays due to technical difficulties. Computer viruses, crashed hard drives, lost or corrupted files, incompatible file formats, and similar mishaps are common issues when using technology, and are not acceptable grounds for a deadline extension.
- Specific technology requirements are required in order to participate and learn effectively in CHM 1488. Some guidance from the U of T Vice-Provost, Students regarding this is available here: [viceprovoststudents.utoronto.ca/covid-19/tech-requirements-online-learning](https://viceprovoststudents.utoronto.ca/covid-19/tech-requirements-online-learning)
- If you are new to online learning, some general advice and tips for students is available here: [onlinelearning.utoronto.ca/getting-ready-for-online](https://onlinelearning.utoronto.ca/getting-ready-for-online)

## VII INSTITUTIONAL POLICIES AND SUPPORT

---

### ACADEMIC INTEGRITY

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto is a strong signal of each student's individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters ([governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019](https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019)) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. Potential offences include, but are not limited to:

In papers and assignments:

1. Using someone else's ideas or words without appropriate acknowledgement.
2. Submitting your own work in more than one course without the permission of the instructor.
3. Making up sources or facts.
4. Obtaining or providing unauthorized assistance on any assignment.

On tests and exams:

1. Using or possessing unauthorized aids.
2. Looking at someone else's answers during an exam or test.
3. Misrepresenting your identity.

In academic work:

1. Falsifying institutional documents or grades.
2. Falsifying or altering any documentation required by the University.

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources (see [www.academicintegrity.utoronto.ca/](http://www.academicintegrity.utoronto.ca/)).

### ACCESSIBILITY NEEDS

Students with diverse learning styles and needs are welcome in CHM 1488. The University of Toronto is committed to accessibility: if you require accommodations for a disability, or have any other accessibility concerns about the course, please contact [Accessibility Services](#) as soon as possible.

### ADDITIONAL SERVICES and SUPPORT

The following are some important links to help you with academic and/or technical service and support:

- General student services and resources at [Student Life](#)
- Full library service through [University of Toronto Libraries](#)
- Resources on conducting online research through [University Libraries Research](#)
- Resources on academic support from the [Academic Success Centre](#)

- Learner support at the [Writing Centre](#)
- Information for [Technical Support/Quercus Support](#)