

# Chemistry 2210A

## Chemistry of the Environment

### Course Outline Fall 2021

*This document provides you with important information regarding this course.  
Please refer to this document throughout the term.*

Updated: September, 2021

## 1. Course Information

**Section:** 001

**Class Time:** Mondays, Wednesdays & Fridays, 1:30 – 2:30 pm

**Location:** UCC-56

### Prerequisites

The **prerequisites** for Chemistry 2210A are: Chemistry 1301A/B *and* 1302A/B; *OR* Chemistry 1301A/B *and* Integrated Science 1001X; *OR* the former Chemistry 1100A *and* 1200B.

The **antirequisites** for Chemistry 2210A are: CEE 2217A/B *AND* Chemistry 4491E.

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

## 2. Instructor Information

Dr. Lijia Liu, PhD

**Email:** [lijia.liu@uwo.ca](mailto:lijia.liu@uwo.ca)

**Office:** Room 066 (Lower Ground Floor), Chemistry Building, Western University

**Office Hours:** By appointment (in-person or Zoom) scheduled via Email.

*Email is the best way to contact me (your instructor). Although I will often reply within one day, please allow up to 48 hours. Please email from your @uwo.ca account and use "CHEM 2210A – Email Topic" in the subject line to ensure that your email reaches me.*

### 3. Course Syllabus, Schedule, Delivery Mode

#### Course Description

Explore the current and future impact of human activity on our environment from a chemical perspective. Analyze the chemistry behind topics such as the ozone hole, air pollution, climate change, fossil fuels and other power sources, and water purification.

#### Learning Outcomes

By the end of this course, students will be able to:

- Describe the impact of human activity on our environment, especially with respect to the ozone hole, air quality, climate, and water.
- Summarize key chemistry processes occurring in the environment to a first-year science student audience through *the Infographic Assignment*.
- Analyze current news articles related to environmental chemistry issues through *the Chemistry in the News VoiceThread Discussion*.
- Describe how ozone is created and destroyed in the natural, unpolluted atmosphere. Demonstrate how man-made chemicals interfere with natural processes to create ozone ‘holes’ and the impact of these on all living species. (Theme 1)
- Identify the root causes and consequences of polluted air. (Theme 2)
- Explain the natural greenhouse effect and how the temperature of the planet is maintained in equilibrium. Identify the impact of human industrial activity and the contribution of carbon dioxide to global warming. Distinguish between global warming and the “greenhouse effect”. Distinguish between biofuels and fossil fuels. Compare renewable energy technology options. (Theme 3)
- Explain the chemistry of natural and polluted water. Identify how water quality is impacted by human activity. Explain how water is purified for human consumption. (Theme 4)

#### Anticipated Course Content (subject to revision#)

Theme	Textbook		Description
	Baird & Cann	VanLoon	
1. Stratospheric Ozone	1	2	Stratospheric Chemistry: The Ozone Layer
	2	3	The Ozone Holes
2. Ground-level pollution	3	4	Ground-Level Air Pollution: Smog
	3,4	5,6	Acid Rain and Aerosols
3. Climate Change	5	8	The Greenhouse Effect

	6	8	Fossil Fuels, CO <sub>2</sub> Emissions and Global Climate Change
	7,8	-	Biofuels and Other Alternative Fuels, Clean Energy
4. Water purification	10	-	The Chemistry of Natural Waters
	11	16	The Pollution and Purification of Water

#Although the themes listed above are the intended course content, the instructor reserves the right to deviate from this list should an interesting topic of environmental concern appear in the news.

*Anything that is covered in class is “testable”. If it is not covered in class, it is not testable.*

## Contingency plan for an in-person class pivoting to 100% online learning

In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, all remaining course content will be delivered entirely online, **synchronously over Zoom** (i.e., at the times indicated in the timetable). The grading scheme will **not** change. Any remaining assessments will also be conducted online as determined by the course instructor.

In the event that online learning is required, a stable *internet connection with working microphone will be required*. As has been the case in the past, the decision to pivot to online learning will be made by Western, and not individual instructors or departments (excepting temporary online instruction in the event of instructor illness)

## 4. Course Materials

### Textbook

There is no required textbook for this course.

#### Suggested textbooks:

The content covered in this course is heavily based on the following two textbooks, which are available (hard copy and digital copy) at the Western Bookstore:

- Environmental Chemistry, 5<sup>th</sup> Edition, by Baird and Cann, Freeman and Company
- Environmental Chemistry, A Global Perspective, 4<sup>th</sup> Edition, by vanLoon and Duffy, Oxford University Press

#### Lecture notes

- Partial lecture notes will be posted prior to each class. It is expected that you will complete the notes by yourself based on the information provided in class.
- Reading materials and other learning resources will be posted on OWL.

Students are responsible for checking the course OWL site (<http://owl.uwo.ca>) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class.

All course material will be posted to OWL: <http://owl.uwo.ca>.

If students need assistance with the course OWL site, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

## 5. Methods of Evaluation

Your course grade, out of 100, will be calculated as listed below. You must achieve a grade of 50% or greater to pass the course.

Component	Date	Weight (normal)	Weight (missed mid-term)
<b>Chemistry in the News VoiceThread Discussion</b>	Throughout the term Reflection assignment due Monday, November 8, 2021	20%	20%
<b>Infographic Assignment</b>	Assignment submission due Friday, November 26th, 2021 Evaluation during Monday, Nov.29th and Friday, Dec. 3rd, 2021	12%	12%
<b>Weekly Quick Quizzes</b>	Throughout the semester Published every Monday (except reading week), submission due Friday of the week	5%	5%
<b>Assignment</b>	At the end of each theme (total of 4)	8%	8%
<b>Mid-term Exam</b>	October 23, 2021 02:00 PM - 04:00 PM	20%	-
<b>Final Exam</b>	Scheduled by the Registrar	35%	55%

Detailed description on each evaluation category is listed below (including accommodated evaluations):

### ❖ **Chemistry in the News VoiceThread Discussion (20%)**

The purpose of this assignment is to have you discover and then analyze current environmental chemistry issues in the world around us by discussing current news articles with your peers. This assignment consists of:

- **Creating and Posting** a VoiceThread about a current news article with your comment
- **Replying** to classmates' posts throughout the six discussion weeks
- **Synthesizing** your discussion experience by responding to reflection questions

The Chemistry in the News discussion groups will be announced on **Friday, September 10th**. The discussion forums will open on **Monday, September 20<sup>th</sup>** and close **Sunday, October 31<sup>st</sup>, 2021**. Once the discussion closes, you will compile your post and responses to reflection questions. This compiled **Reflection** is due on OWL (under Assignments) by **Wednesday, November 10<sup>th</sup>, 2021**. You are welcome to submit this reflection earlier, but late submissions will be deducted **10%** per day unless academic consideration or accommodation is obtained. This Reflection will be graded, while the actual VoiceThread on OWL will be referenced to confirm dates and posts, to determine your grade for this assessment.

### ❖ **Infographic Assignment (12%)**

The purpose of this assignment is to have you explore a Chem 2210A topic more deeply, and synthesize the key issues by demonstrating your understanding of this topic. Organizing and teaching someone *else* a topic allows you to learn the issues more deeply yourself. These infographics will also be a valuable review tool to share with your classmates during the *Infographic Display Week*, which is scheduled toward the very end of the class. *In pairs*, you will select a topic covered in Chem 2210A and prepare an infographic summarizing key ideas and equations in a visually appealing way, accessible to a first-year science audience.

This infographic will be evaluated through a peer-review system (i.e. your work will be evaluated by your classmates and you will also evaluate their works) for scientific accuracy, clarity of explanations and images, visual appeal, and accessibility to a first-year science student audience. Rubric will be provided to ensure consistent marking. This assignment must be submitted by **Friday, November 26<sup>th</sup>**. Late submission will be subjected to a **30%** deduction. Submission after **November 28<sup>th</sup>** will not be accepted. Peer-review will be conducted during the week of **November 29<sup>th</sup> – December 3<sup>rd</sup>**.

A detailed description of this assessment will be available on OWL, along with a rubric for assessment.

### ❖ **Weekly quick quizzes (5%)**

The purpose of these quizzes is to serve as quick check points. They help you keep up with the pace of the course. There are typically ~1-3 questions per 1-hour lesson. The quiz questions will be posted weekly on OWL (typical on Mondays), and will only remain active for that week. It is not mandatory to answer all the questions, and only corrected answers will be recorded as valid answers. You will be marked following the scheme below:

5 points:  $\geq 70\%$  of valid answers were provided

4 points:  $\geq 60\%$  of valid answers were provided

3 points:  $\geq 50\%$  of valid answers were provided

2 points:  $\geq 40\%$  of valid answers were provided

1 point:  $\geq 30\%$  of valid answers were provided

### ❖ **Assignments (8%)**

There are a total of four assignments. Each will be released at the end of a theme and remain active for a week. The assignment is expected to take no more than 40 min to complete, and you can work on it

any time while it is active. There is no time restriction once you start. The purpose of these assignments is to help you digest the important knowledge delivered in the course.

### ❖ **Mid-term (20%) and Final Exam (35%)**

- **Mid-term test** will cover all the material in the first two themes (approximately). The exact cut-off material will be announced in class and on OWL.
- The **Final Exam** will be cumulative. Material covered on the mid-term test will be assessed on the final exam through similar questions that appeared on the midterms. Details will be provided in late November.

**There is no make-up test for the mid-term.** If your faculty Dean's Office has approved your circumstances, the value of the mid-term test will be shifted to the Final Exam as described in the table shown on the previous page.

## **6. Student Absences**

### **Academic Consideration for Student Absences**

Students who experience an extenuating circumstance (illness, injury or other extenuating circumstance) sufficiently significant to temporarily render them unable to meet academic requirements may submit a request for academic consideration through the following routes:

- (i) Submitting a Self-Reported Absence (SRA) form provided that the conditions for submission are met. To be eligible for a Self-Reported Absence:
  - an absence must be no more than 48 hours
  - the assessments must be worth no more than 30% of the student's final grade
  - no more than two SRAs may be submitted during the Fall/Winter term
- (ii) For medical absences, submitting a Student Medical Certificate (SMC) signed by a licensed medical or mental health practitioner to the Academic Counselling office of their Faculty of Registration.
- (iii) Submitting appropriate documentation for non-medical absences to the Academic Counselling office in their Faculty of Registration.

Note that in all cases, students are required to contact their instructors within 24 hours of the end of the period covered, unless otherwise instructed in the course outline.

Students should also note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons. **All documentation required for absences that are not covered by the Self-Reported Absence Policy must be submitted to the Academic Counselling office of a student's Home Faculty.**

For the policy on Academic Consideration for Student Absences – Undergraduate Students in First Entry Programs, see:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/accommodation\\_illness.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_illness.pdf)

and for the Student Medical Certificate (SMC), see:

[http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/medicalform.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf).

## **Religious Accommodation**

When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at

<https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>.

## **Absences from Final Examinations**

If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (the name given by the University to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period).

If a student fails to write a scheduled Special Examination, the date of the next Special Examination (if granted) normally will be the scheduled date for the final exam the next time this course is offered. The maximum course load for that term will be reduced by the credit of the course(s) for which the final examination has been deferred. See the Academic Calendar for details (under [Special Examinations](#)).

# **6. Accommodation and Accessibility**

## **Accommodation Policies**

Students with disabilities work with Accessible Education (formerly SSD), which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/Academic Accommodation\\_disabilities.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf),

# **7. Academic Policies**

The website for Registrarial Services is <http://www.registrar.uwo.ca>.

In accordance with policy,

[https://www.uwo.ca/univsec/pdf/policies\\_procedures/section1/mapp113.pdf](https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf),

the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner.

Only non-programmable calculators are permitted on tests and exams.

**Scholastic offences** are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

[http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_undergrad.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf).

Computer-marked multiple-choice tests and exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

## **8. COVID-related policies**

### **Masking Guidelines**

Students will be expected to wear triple layer, non-medical, paper masks at all times in the classroom as per University policy and public health directives. Students who are unable to wear a mask must seek formal accommodation through Western Accessible Education, and present medical documentation.

Students are not permitted to eat or drink while in class to ensure masks stay in place. Students will be able to eat and drink outside of the classroom during scheduled breaks.

Students unwilling to wear a mask as stipulated by Western policy and public health directives will be referred to the Dean, and such actions will be considered a violation of the student Code of Conduct.

### **Course Absences due to Daily COVID Screening Questionnaire**

Missed assessments (e.g., presentations, essays, quizzes, tests, midterms, etc.) require formal [academic considerations](#) (typically self-reported absences and/or academic counselling).

Methods for dealing with missed work and course content are at the discretion of the instructor(s). Students should be aware that some learning outcomes cannot be easily made up and may need to be completed in a subsequent year. Your instructor will provide you with further information as to how this applies within this course.

Students who demonstrate a pattern of routinely missing coursework due to self-reported COVID symptoms, and therefore do not demonstrate mastery of the learning outcomes of the course, will not receive credit for the course.

## **9. Support Services**

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: <https://www.uwo.ca/sci/counselling/>.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at (519) 661-2147 if you have any questions regarding accommodations.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: <https://www.uwo.ca/se/digital/>.

Learning-skills counsellors at the Student Development Centre (<http://www.sdc.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Students who are in emotional/mental distress should refer to Mental Health@Western (<http://www.health.uwo.ca/mentalhealth>) for a complete list of options about how to obtain help.

Additional student-run support services are offered by the USC, <http://westernusc.ca/services>.