

Chem 2210A Chemistry of the Environment

Course Outline

Fall 2022

Updated: September, 2022

1. Course Information

Course name: Chemistry of the Environment (2210A)

Academic term: Fall (September 2022 – December 2022)

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

Location: Kresge Building (KB)-K106

List of 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

Office: ChB 1A (Ground Floor)

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.
- Analyze current news articles related to environmental chemistry issues.
- 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#)

Themes and anticipated weekly progress	Textbook*		Description
	Baird & Cann	VanLoon	
Atmospheric chemistry Week 1-4	1	2	Atmospheric Chemistry (Atmosphere composition, sunlight, photochemical reactions)
	2	3	The Ozone Holes
Air quality Week 5-7	3	4	Ground-Level Air Pollution: Smog
	3,4	5,6	Acid Rain and Aerosols
Climate Week 8-10	5	8	The Greenhouse Effect
	6	8	Fossil Fuels, CO ₂ Emissions and Global Climate Change
	7,8	-	Biofuels and Other Alternative Fuels, Clean Energy

Water Week 11-12	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.

*See next section for course materials. Content appears in the lectures are testable. If it is not covered in class, it is not testable.

Key Sessional Dates:

Classes begin: September 8, 2022

Fall Reading Week: October 31 – November 6, 2022

Classes end: December 8, 2022

Exam period: December 10 – 22, 2022

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, affected course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will **not** change. Any remaining assessments will also be conducted online as determined by the course instructor.

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, 5th Edition, by Baird and Cann, Freeman and Company
- Environmental Chemistry, A Global Perspective, 4th 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.

Course Website

Class announcements, course updates, lecture notes, and additional learning resources will be posted on Western's OWL system (<http://owl.uwo.ca>), under our OWL course page (CHEM 2210A 001 FW22). This is the primary method by which information will be distributed to all students in the course. Weekly quizzes and assignments will be conducted on the OWL platform as well. Students are responsible for checking OWL on a frequent basis to stay informed.

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.

Technical Requirements

Computer with internet connection, working microphone.

Scanner or camera for converting paper document to electronic files and upload onto OWL.

5. Methods of Evaluation

Your course grade, out of 100, will be calculated as listed below. In order to pass the course, you must achieve a total course grade of 50% or greater, AND receive a grade of 40% or greater on the final exam.

Component	Date	Weight (normal)	Weight (missed mid-term)
Chemistry in the News VoiceThread Discussion	Throughout the term Reflection assignment due Monday, November 7, 2022	18%	18%
Infographic	Assignment submission due Friday, November 25, 2022 Peer-evaluation during Monday, Nov. 28 and Friday, Dec. 2, 2022	12%	12%
Weekly Quick Quizzes	Throughout the semester Published every Monday (except reading week), submission due Friday of the week	5%	5%
Assignment	At the end of each theme (total of 4)	10%	10%
Mid-term Exam	October 22	20%	-
Final Exam	Scheduled by the Registrar	35%	55%

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

❖ **Chemistry in the News VoiceThread Discussion (18%)**

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 **Monday, September 12th**. The discussion forums will open on **Monday, September 19th** and close **Sunday, October 30th, 2022**. 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 9th, 2022**. 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.

A detailed description of this assessment will be available on OWL

❖ **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. *With in pairs or on your own*, 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 25th**. Late submission will be subjected to a **30%** deduction unless academic consideration or accommodation is obtained. Submission after **November 27th** will not be accepted. Peer-review will be conducted during the week of **November 28th – December 2nd**.

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 correct answers will be recorded as valid answers. At the end of the

semester, the total # of valid (correct) answers will be counted, and the marks will be assigned based on the # of valid answers among the total # of quiz questions released throughout the semester. You will be marked following the scheme below:

$$N = \frac{\text{total valid answers provided}}{\text{total number of quiz questions}}$$

5 points: $N \geq 70\%$

4 points: $N \geq 60\%$

3 points: $N \geq 50\%$

2 points: $N \geq 40\%$

1 point: $N \geq 30\%$

❖ **Assignments (10%)**

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.

Late penalty: Late submission (without pre-approved accommodation) will lead to a 10% mark deduction if the submission is made within 1 week after the deadline. Submission 1 week later than the originally set deadline will not be accepted.

You must submit at least 2 out of the 4 assignments during the course. Students who fail to meet this requirement, whether excused or not, will receive 0% for the assignment component of the course grade, regardless of the actual marks on the completed assignments.

❖ **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

If you are unable to meet a course requirement due to illness or other serious circumstances, please follow the procedures below.

Weekly Quick Quizzes

See grading mechanism in the section above. No medical excuses are accepted.

VoiceThread “Commenting” activity

No medical excuses are accepted.

All other evaluated activities (Assignment, infographic, VoiceThread article posting and reflection report, mid-term test)

You must provide valid medical or supporting documentation to the Academic Counselling Office of your Faculty of Registration as soon as possible. For further information, please consult the University’s medical illness policy at

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf.

The Student Medical Certificate is available at

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf.

Please reach out to your instructor as soon as you are able to arrange an alternative evaluation mechanism for the missed work.

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 (SPC), 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. Students who fail to write an approved SPC examination on that date forfeit that privilege and must apply again. The maximum course load for the term in which the SPC was granted will be reduced by the appropriately. See the Academic Calendar for details (under [Special Examinations](#)).

6. Accommodation and Accessibility

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>.

Accommodation Policies

Students with disabilities are encouraged to contact Accessible Education, 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,

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 their official university address is attended to in a timely manner.

The use of a non-programmable calculator is permitted during mid-term and final 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.

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. 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/>.

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

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

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

http://academicsupport.uwo.ca/accessible_education/index.html

if you have any questions regarding accommodations.

Learning-skills counsellors at the Student Development Centre (<https://learning.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.

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/>.

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