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

Course Description
Calendar description: The environmental chemistry of air, water and soil.

Course Instructor
Dr. Christina Booker, PhD
Email: cbooker2@uwo.ca
Office: Room 21 (Ground Floor), Chemistry Building, Western University
Office Hours: By appointment 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 be sure to email from your @uwo.ca account and use “CHEM 2210 – Email Topic” in the subject line to ensure that your email reaches me.

Class Information
Section: 001
Class Time: Mondays, Wednesdays & Fridays, 1:30 – 2:20 pm
Location: NCB-113

Requisites
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 prerequisites 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.

Accessibility
Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Student Accessibility Services (formerly Services for Students with Disabilities) at 661-2147 or http://www.sdc.uwo.ca/ssd/ if you have questions regarding accommodation.
Course Website
News, course updates, discussion forums, and lecture notes will be posted on Western’s OWL system (http://owl.uwo.ca), under our OWL course page. This is the primary method by which information will be distributed to all students in the course. You are responsible for checking OWL on a frequent basis to stay informed. Every effort will be made to post lecture notes by 6 pm the day prior to the related class.

Learning Outcomes
Course 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 use of chemicals and fossil fuels, through Critical Thinking in Class (iClicker), and Tests/Exam.
- Summarize key chemistry processes occurring in the environment to a first-year science student audience through the Group Infographic Assignment.
- Identify current, relevant news articles related to environmental chemistry issues, and analyze these topics through the Chemistry in the News Online 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. (Unit 1&2)
- Identify the root causes and consequences of polluted air. (Unit 3&4)
- 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”. (Unit 5&6)
- Distinguish between biofuels and fossil fuels. Compare renewable energy technology options. Describe the basic mechanism of nuclear fission reactors and problems associated with spent fuel. (Unit 7-9)
- 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. (Unit 10&11)

Course Materials
Textbook
It is strongly recommended that you acquire a copy of this textbook, which is available at the Western Bookstore.

Baird and Cann
Environmental Chemistry, 5th Edition
Freeman

Copies of the text and the solutions manual are available on 1-day reserve at the Taylor Library. The 4th Edition of the text is suitable for most of the course material, but please note that the chapters have been renumbered from the 4th to 5th edition, so care must be taken if you choose to use the 4th edition.

Calculator
The Sharp EL-510R(B) or Sharp EL-510RN(B) scientific calculator are the only models permitted during tests and exams (if needed). This is the same calculator model that was required for Chemistry 1301/1302. All other models will be confiscated is used during tests/exam. In order to be fair and consistent to all students, proctors cannot lend (or facilitate the lending of) calculators during tests or exams. It is your responsibility to bring the correct calculator and to ensure that it is in proper working order. The sharing or exchanging of calculators during tests or exams is not permitted.
Wi-Fi Enabled Device
A Wi-Fi enabled device can be used during class times to submit responses to critical thinking, analysis, and discussion questions. A smart phone, tablet, or laptop can be used for this purpose alongside Western’s Wi-Fi access (with your Western username and password). If you do not have a Wi-Fi enabled device, have no fear, and please read the “Critical Thinking in Class” section below for an alternative for you.

Course Evaluation
Your course grade, out of 100, will be calculated as listed below. *Your grade will automatically be reported using the weight version that gives you the higher final course grade. You must achieve a grade of 50% or greater to pass the course.

<table>
<thead>
<tr>
<th>❖ Component</th>
<th>Date</th>
<th>Weight* (Version #1)</th>
<th>Weight (Version #2)</th>
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<tbody>
<tr>
<td>Group Infographic Assignment</td>
<td>Submitted November 30th, 2018</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>at beginning of class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Critical Thinking in Class (iClickers)</td>
<td>Throughout the term</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>Chemistry in the News Online Discussion</td>
<td>Post by October 29th, 2018</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Replies by November 12th, 2018</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test #1</td>
<td>Friday, October 5th, 2018</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>Test #2</td>
<td>Friday November 9th, 2018</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>Scheduled by the Registrar</td>
<td>40%</td>
<td>45%</td>
</tr>
</tbody>
</table>

❖ Group Infographic
Each student will be assigned to a small group in November (approximately 3 students per group), and as a group, you will select a topic covered in Chem 2210 and prepare an infographic summarizing key ideas and equations in a visually appealing way, accessible to a first-year science audience. The purpose of this assignment is to have you explore a Chem 2210 topic more deeply, and have you synthesize the key issues simply, demonstrating your understanding of a complex 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 as the course wraps up. Class time will be set aside for small group work on this project, but additional time may be required to complete this assignment outside of class.

This infographic will be evaluated for scientific accuracy, clarity of explanations and images, visual appeal, and accessibility to a first-year science student audience. A rubric will be posted on the OWL course site for your reference. This assignment must be brought to class at 1:30 pm on November 30th for the Infographic Display Day. Infographics submitted after this date will have an automatic deduction of 30% and will not be accepted after December 3rd. If you know you will be absent on November 30th for an important reason, please email me prior to November 30th to determine if alternate arrangements can be made.
❖ **Critical Thinking in Class**

The purpose of this evaluation component is to encourage you to engage your mind in the material we discuss during class. This will also prompt conversations amongst the class to discuss the concepts and problems proposed during lecture. Critical thinking, analysis, and discussion questions will be posed during class time, and responses will be collected using Western’s iClicker audience response system. The iClicker software, accessible through the OWL course page, is a free (to you) software that is supported by the institution. Thus, rest assured your personal information and privacy will be protected. Also know that data gathered using this software will not be used for research purposes without the express written permission of the student. *Physical clicker devices will not be used.* Instead, any Wi-Fi-enabled device (phone, tablet, computer) can be used to submit responses and will act as your “Personal Response System”.

You must set up an account (link through the OWL course page) in order to access the questions, and you will use this same account throughout the term. We will discuss how to set up this account during the first week of class. **Please note that Western has Wi-Fi access in the classrooms,** so you will not need to use up your personal data package to respond to questions.

*If you do not have an electronic device* you can still participate in the Critical Thinking in Class and earn a grade for this evaluation component! A pdf response sheet can be printed off the OWL course page and brought to class. You can record your responses in pen on this sheet during the lecture and submit this to me at the conclusion of each class. Please note – these paper forms will *only* be accepted immediately following the class in which the questions were asked. If you have any questions on how to meet these requirements, I am happy to discuss them with you.

In order to assign a grade for this component, 2 points will be given for a correct answer, 1 point will be given for an incorrect answer (as attempts and learning from errors IS valuable!), and 0 points will be given for no response. If you are absent from class, your non-responses will fit in the “no response” category for those questions and earn a grade of 0. It is understandable that sickness and other commitments may keep you from the occasional class, and thus, the grading scheme below has **built-in accommodation** for the occasional absence, as well as any technical difficulties you may encounter during the term. Thus, *additional* accommodation will *not* be granted to make-up this grade. There will be many questions posed throughout the term, so you will have ample opportunity to demonstrate your analysis and critical thinking. At the conclusion of the course, the final 5% evaluation component will be calculated as follows:

<table>
<thead>
<tr>
<th>Percentage of Possible Points (%)</th>
<th>≥80</th>
<th>≥70</th>
<th>≥60</th>
<th>≥50</th>
<th>≥45</th>
<th>≥40</th>
<th>≥35</th>
<th>≥25</th>
<th>≥15</th>
<th>≥0</th>
<th>0</th>
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</thead>
<tbody>
<tr>
<td>Grade Achieved (out of 5)</td>
<td>5.0</td>
<td>4.5</td>
<td>4.0</td>
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<td>3.0</td>
<td>2.5</td>
<td>2.0</td>
<td>1.5</td>
<td>1.0</td>
<td>0.5</td>
<td>0</td>
</tr>
</tbody>
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❖ **Chemistry in the News Online Discussion**

The purpose of this assignment is to have you discover and then analyze current environmental chemistry issues in the world around us. This assessment is divided into two parts.

*Your Post (5%)*

Your task will be to find a current article or news story (published in the past 3 years) that is related to environmental chemistry. This news article should be from a reputable source, such as a main news outlet (Globe and Mail, CBC, etc, NOT your friends Facebook post) or a scientific journal. If you want feedback on the reputable status of your article choice, just ask! You will then post a link to your article on the Chemistry in the News discussion board on the OWL course page following these expectations:

1. **Write** a succinct, informative title for the post. (Using the news article post title is fine).
2. **Hyperlink** to your article. (Ensure the link works!)
3. **Summarize** the article in 3-4 sentences (not an essay, here!). This summary must be *in your own words* and may *not* include quotations from the article. Identify the *key issues* and *relevance* of this article to our course.

4. **Evaluate** the article in 1-2 sentences. Suggested questions you could answer include: Do you agree with this article? Why or why not? Are there any outstanding questions you have on this issue? Is there a response that is required from society? Any questions you have that could provoke further discussion?

Your post will be evaluated for identification of a relevant, current issue; clarity and accuracy of your summary and evaluation; demonstration of critical thought in your evaluation of the article. A rubric will be posted on the OWL course site. All posts are due, at the latest, by **Monday, October 29th, 11:59 pm**. Late posts will not be accepted. I suggest completing this assignment *earlier* during the term rather than later. Do not leave this to the last minute! If two people happen to post about the same article in the same discussion forum, only the first person will receive credit for this post (even if it is only by a few seconds).

**Your Replies (5%)**

Reply to a minimum of **three** posts from your classmates on the OWL forum. Your replies must demonstrate that you have read their hyperlinked article and their summary/evaluation of the article. Acceptable replies could include one of the following:

- Posing an additional question you would want to ask an expert in the field *OR*
- Responding to a classmate’s question *OR*
- Writing an additional comment on any environmental/societal implications *OR*
- Adding a note of clarity to the explanation of the chemistry content of the article *OR*
- Describing the most interesting point you learned from the news article

Each reply must be 2-4 sentences in length and will be marked for completion. All replies are due on the discussion forum by **Monday, November 12th, 11:59 pm, 2018**. Late replies will not be accepted.

**Test #1, #2, and Final Exam**

Both tests will be held during the normal class time and be 45 minutes in length. Room locations will be announced on OWL. If you miss Test #1 and receive formal accommodation from your academic advisor for illness or personal reasons, the weight of this test will be added to Test #2. If you miss Test #2 for illness or personal reasons and receive formal accommodation, the weight will be added to the Final Exam. If you must miss a test for a scheduling conflict caused by Western University, a make-up or early-write test will be offered. Please note that regularly scheduled classes take precedence over midterm tests from other classes. The final exam is scheduled by the Registrar. Both tests and the exam are multiple choice.

- **Test #1** will cover all the material from the start of the term up to the Friday class before the test (approximately). The exact cut-off material will be announced in class and on OWL.
- **Test #2** will cover all the material since the first cut off (for Test #1) to the material covered on the Friday prior to the test (approximately). The exact cut-off material will be announced in class and on OWL.
- The **Final Exam** will be cumulative, but material covered on the first two tests will be assessed on the final exam through very similar questions that appeared on the midterms.

**Code of Conduct for Class and Online Discussion**
To foster a supportive and enriching academic environment that is conducive to learning and free inquiry, Western has a Student Code of Conduct (http://www.uwo.ca/univsec/board/code.pdf).

As your instructor, I will promote this respectful and supportive learning environment both in class and online. In turn, I expect students in this course to also respect their fellow classmates and instructor, both during class times and through online discussions. Please be sure to phrase your ideas in a way that is respectful to all involved.

I will do my best to ensure I arrive on time, prepared and eager to teach – and I likewise expect you to arrive on time (as often as possible!) prepared, and ready to engage. I hope this course will be an excellent learning experience for you!

**Policies**

**Electronic Device Policy**

We will use electronic devices during class time for iClicker questions and for some research activities. You are also welcome to take notes on your device or by pen/paper during class time. That said, please only use your electronic devices for course-related activities during class time. All other uses of electronic devices are distracting to your learning, and to the learning of those around you, and you may be asked during the lecture to cease your distraction to others. If you need to take a phone call or engage in an off-task activity during class time, please step out of the classroom to complete your task and join us when you are ready to engage again.

**Email Policy**

Please ensure your emails are written in a professional format and tone. If you have questions about specific course topics/questions, please use the OWL forum so that all students can benefit from the discussion.

In accordance with policy, http://www.uwo.ca/its/identity/activatenonstudent.html, 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.

**Tests and Exam Policy**

Students seeking academic accommodations based on medical (physical or mental) illness should begin by contacting the Academic Counsellors of their home faculty. Please visit the following link for policy on Accommodation for Illness: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_illness.pdf

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 website: http://www.uwo.ca/univsec/handbook/appeals/scholoff.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.

For all tests and exams, it is the policy of the Department of Chemistry that any electronic devices, i.e., cell phones, tablets, cameras, or iPod are strictly prohibited. Only the specified calculator is permitted. All other devices MUST be left either at home or with the student’s bag/jacket at the front of the room and MUST NOT be at the test/exam desk or in the individual’s pocket. Any student found with one of these prohibited devices will receive a grade of zero on the test or exam. The Department of Chemistry is not responsible for
stolen/lost or broken devices.

**Missed Course Components**
If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or supporting documentation to the Academic Counselling Office of your home faculty as soon as possible.

If you are a science student, the Academic Counselling Office of the Faculty of Science is located in NCB 280, and can be contacted at 519-661-3040 or scibmsac@uwo.ca. Their website is: http://www.uwo.ca/sci/undergrad/academic_counselling/index.html.

A student requiring academic accommodation due to illness must use the Student Medical Certificate (https://studentservices.uwo.ca/secure/medical_document.pdf) when visiting an off-campus medical facility. For further information, please consult the university’s medical illness policy at: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf.

If you miss the Final Exam, contact your faculty’s Academic Counselling Office as soon as possible. They will assess your eligibility to write the Special (or makeup) Exam.

You may also be eligible to write the Special Exam if you are in a “Multiple Exam Situation” (see http://www.registrar.uwo.ca/examinations/exam_schedule.html).

**Equal Opportunity and Evaluation Policy**
The university is committed to academic integrity and has high ethical and moral standards. All students will be treated equally and evaluated using the criteria presented in this course outline and their respective weights. The evaluation criteria are based strictly on actual achievement, not on effort or how hard the student tried. Claims of an excellent academic history, of attendance in the course components, or of personal issues (family, relationship, financial, etc.) cannot be used to justify a higher grade in course because they are not criteria for evaluation.

There is no extra work available for extra credit or to “make up” another grade. No extra assignments, essays, experiments, or other work of any kind is offered to any student.

The requirement for a higher grade in order to, for example, maintain a scholarship, enter a program, or obtain a higher GPA for various reasons, is not a justifiable reason for increasing your grade. If we increased or “bumped” your grade (i.e. gave you a grade that you did not legitimately earn), it would be unfair to the other students and also a great disservice to the scholarships and programs who are evaluating all students on the basis of their grades.

Please contact your academic advisor if you require formal accommodation for missing a course component.

**Support Services**
Students are encouraged to make use of the free, study-skills courses and other services, including learning-skills counselling, provided by the Student Success Centre, success.uwo.ca. Since this course includes multiple choice tests, I encourage you to take advantage of the free test-taking workshops offered to you!

The website for Registrarial Services is Registrar: http://www.registrar.uwo.ca
USC Services: http://westernusc.ca/services/
Students who are in emotional/mental distress should refer to Mental Health@Western
http://www.health.uwo.ca/mental_health/ for a complete list of options about how to obtain help. Crisis
contact information is available at: https://wjww.uwo.ca/health/mental_wellbeing/crisis.html

The policy on Accommodation for Students with Disabilities can be found here:
www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_disabilities.pdf

The policy on Accommodation for Religious Holidays can be found here:
http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

Department of Chemistry on Social Media:
Webpage - https://www.uwo.ca/chem/
Twitter - https://twitter.com/westernuchem
Facebook - https://www.facebook.com/ChemistryatWestern
### Anticipated Course Topics (subject to revision* and not necessarily in this order)

<table>
<thead>
<tr>
<th>Textbook Chapter</th>
<th>Title Description</th>
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<tbody>
<tr>
<td>Baird &amp; Cann Environmental Chemistry 5th Edition</td>
<td></td>
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</tbody>
</table>

1. Stratospheric Chemistry: The Ozone Layer  
2. The Ozone Holes  
3. The Chemistry of Ground-Level Air Pollution  
4. The Environmental and Health Consequences of Polluted Air — Outdoors and Indoors  
5. The Greenhouse Effect *(up to Section 5.26)*  
6. Energy Use, Fossil Fuels, CO₂ Emissions and Global Climate Change *(up to Section 6.26)*  
7. Biofuels and Other Alternative Fuels  
9. Radioactivity, Radon and Nuclear Energy  
10. The Chemistry of Natural Waters  
11. The Pollution and Purification of Water  

*Although the topics listed above are the *intended* course topics, 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 or in an assigned reading is “testable”. If it is not covered in class, and it is not in any readings I may assign, it is not testable.*