



CHEMISTRY 301 109  
AQUEOUS ENVIRONMENTAL CHEMISTRY 2020W1  
(SEPTEMBER-DECEMBER 2020)

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### ACKNOWLEDGEMENT

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UBC's Point Grey Campus is located on the traditional, ancestral, and unceded territory of the xwməθkwəyəm (Musqueam) people. The land it is situated on has always been a place of learning for the Musqueam people, who for millennia have passed on their culture, history, and traditions from one generation to the next on this site.

### COURSE INFORMATION

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CHEM 301 is an introduction to properties and composition of natural waters. Gas and solid equilibria, pH, redox chemistry, complexation, corrosion treatment, acid rain, ion exchange, colloids and microbial transformations.

CHEM 301 will be using Team-Based Learning (TBL) format for some of its classes. TBL aims to increase your understanding of course concepts by using them to solve authentic, real-world problems and help you develop your critical learning skills. The primary class objective shifts to helping you learn how to use course content to solve problems.

**There will be 6 "TBL Events". They are tentatively schedule for: September 21, September 28, October 5, October 30, November 25 and November 30.**

Lecture Time	Lecture Location	Requirements
Mondays, Wednesdays, Fridays 9-9:50am	UBC CHEM 301 109 Canvas Site: Collaborate Ultra for most classes with TBL classes on Zoom	Lectures will be recorded and available on Canvas for 30 days. You must complete in-class assignments within 24 hours of the start of the lecture.  TBL Events will NOT be recorded. You are required to attend to earn any group marks.

PREREQUISITES: CHEMISTRY 123

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### CONTACTS

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Course Instructor(s)	Contact Details	Office Hours	Office Hour Location
Dr. Anka Lekhi	<a href="mailto:anka@chem.ubc.ca">anka@chem.ubc.ca</a>	Tuesdays 8:30-9:30am Tuesdays 12:30-2pm Fridays 2-3pm and by appointment	TBA
Matthew Drayton	<a href="mailto:mdayton@chem.ubc.ca">mdayton@chem.ubc.ca</a>	Mondays 5-6pm	TBA

## LEARNING OUTCOMES

Students will explore the following topics:

1. Properties of natural waters, fundamentals of environmental chemistry

- Physical properties of water, seasonal cycles in lakes, dissolved gases, carbonate equilibria, buffers, alkalinity, basicity, and hydrolysis of metals.
- Speciation, coordination, solubility, chelation by natural and anthropogenic ligands.

2. Redox equilibria - pE, Nernst equation, pE-pH diagrams, corrosion.

3. Microbial transformations - Microbially mediated redox reactions, transformations of carbon, nitrogen, sulfur and iron, acid rock drainage (ARD).

4. Phase interactions (Liquid-Solid-Gas) - Sediments, clay minerals, intrinsic solubility, aggregation, sorption, ion exchange, processes in sediments and interstitial waters.

5. Water pollution - Metals, organometallics, cyanide, nutrients, soaps/detergents, acidity, pesticides, dioxins, PCB's, radioactivity.

6. Water treatment -Primary, secondary and tertiary treatments, methods for removal of metals, organics and solids, sewage and hazardous waste treatment.

## LEARNING MATERIALS

Notes	The course notes (both posted and in-class) and assignments define the course. Course notes in the form of pdf slides will be posted in the CHEM 301 Canvas site by 5pm the day before class. Please read these ahead of class. In-class worksheets will be posted just before class starts.
Required Readings	Only the readings assigned for TBL events are examinable. All other readings are supplementary. Required readings will be drawn from online chapters from various textbooks have been posted on CHEM 301 Canvas Library Course Reserves.
Optional Readings	"Environmental Chemistry" 8 or 9th Ed., S.E. Manahan

## ASSESSMENTS OF LEARNING

- Midterms (2): 30% (15% each midterm)
- Team-based Learning Activities: 30%
- In class participation: 3%
- On-line quizzes: 7%
- Final Exam: 30%

Midterms 30%	<p><b>Midterm 1: October 14<sup>th</sup> opens online at 4am and closes 10am</b></p> <p><b>Midterm 2: November 18<sup>th</sup> opens online at 4am and closes 10am</b></p>
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	A missed midterm will be given a zero score, and no make-up will be given for individual students. Anyone who misses a test for a valid and documented reason will normally be excused from that test and the test value (15% of the final course grade) added to the value of the final examination. Consult with the instructor as soon as possible after the missed test.
Team-based Learning Activities 30%	<p>During each TBL Event, each student will write a Readiness Assurance Test (RAT) on Canvas prior to lecture based on the pre-readings (worth 24%). After the individual test, pre-assigned teams will write the same test together a Qualtrics Immediate Feedback form (gRAT). This will be followed by an application activity. Group activities are worth 6%. The application activity will involve one or more problem(s) where teams need to make a decision. <b>You must participate fully to receive group marks. Groups complete a peer evaluate at the end of term.</b> The TBL events may spill over into the following lecture.</p> <p>A missed gRAT will be given a zero score and there is no make up. Anyone who misses a test for a valid and documented reason will normally be excused from that test and the test value added to the value of the final examination. Consult with the instructor as soon as possible after the missed test.</p>
Online Quizzes 7%	<p>On-line quizzes will contain questions taken verbatim from the problem sets as well as other questions. You will have limited time on the quizzes and you do not know which questions from the problem sets will be used, so do the relevant problem sets first before attempting the quiz.</p> <p>Quiz Dates:</p> <p><b>Quiz #1; Opens October 2nd at 3pm and Closes Tuesday, October 6 at 11:59pm.</b></p> <p><b>Quiz #2: Opens November 6 at 3pm and Closes Tuesday, November 10 at 11:59pm.</b></p>
Participation 3%	In-class participation will be measured through using Canvas Lecture Quizzes, which will be due 24 hours after the start of lecture.

## UNIVERSITY POLICIES

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions.

Details of the policies and how to access support are available on [the UBC Senate website](#).

During this pandemic, the shift to online learning has greatly altered teaching and studying at UBC, including changes to health and safety considerations. Keep in mind that some UBC courses might cover topics that are censored or considered illegal by non-Canadian governments. This may include, but is not limited to, human rights,

representative government, defamation, obscenity, gender or sexuality, and historical or current geopolitical controversies. If you are a student living abroad, you will be subject to the laws of your local jurisdiction, and your local authorities might limit your access to course material or take punitive action against you. UBC is strongly committed to academic freedom, but has no control over foreign authorities (please visit <http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,33,86,0> for an articulation of the values of the University conveyed in the Senate Statement on Academic Freedom). Thus, we recognize that students will have legitimate reason to exercise caution in studying certain subjects. If you have concerns regarding your personal situation, consider postponing taking a course with manifest risks, until you are back on campus or reach out to your academic advisor to find substitute courses. For further information and support, please visit: <http://academic.ubc.ca/support-resources/freedom-expression>.

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## LEARNING ANALYTICS

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Learning analytics includes the collection and analysis of data about learners to improve teaching and learning. This course will be using the following learning technologies: Canvas, Collaborate Ultra, and Zoom. Many of these tools capture data about your activity and provide information that can be used to improve the quality of teaching and learning. In this course, I plan to use analytics data to:  
(Example data uses:)

- View overall class progress
- Track your progress in order to provide you with personalized feedback
- Review statistics on course content being accessed to support improvements in the course
- Track participation in discussion forums
- Assess your participation in the course]

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## ACADEMIC MISCONDUCT

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The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the President's Advisory Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences.

A more detailed description of academic integrity, including the University's policies and procedures, may be found in the Academic Calendar at

<http://calendar.ubc.ca/vancouver/index.cfm?tree=3,54,111,0>.

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Classes and office hours will be held through Collaborate Ultra and Zoom, which is integrated with our Canvas course. Please note that Collaborate Ultra lectures will be recorded and posted to Canvas – all recordings will be kept secure, and will only be available to students enrolled in the course. Do not distribute recordings of the class sessions as doing so is a copyright violation as well as violation of your classmates' and instructor's privacy.