

Introduction to Environmental Chemistry
CHEM 2240
Spring Quarter, 2020

Instructor: Dr. J. Alex Huffman
Zoom Office: <https://udenver.zoom.us/my/alexhuffman>
Contact Info: Email – alex.huffman@du.edu
Office Hours: Will be conducted via Dr. Huffman Zoom office (link above); times TBD

Class Time: MWF, 9:00 – 9:50 AM
Class Location: Remote via Zoom, Canvas (both live/synchronous and recorded/asynchronous)
Zoom lecture room: <https://udenver.zoom.us/j/563506326> (same link in Canvas)

Graduate TA: Rachel Davey
Zoom Office: <https://udenver.zoom.us/my/racheldavey>

SEC: Science and Engineering Center (aka TA Help Room)
Details: <http://portfolio.du.edu/SEC/page/52141>
Zoom Room: <https://udenver.zoom.us/my/sec.chemistry>

REQUIRED COURSE ITEMS

Calculator: You will need an inexpensive calculator that has the capability for square roots, logarithms, and exponents. You are responsible for understanding how to perform these operations on your calculator.

Zoom: I strongly recommend you download the Zoom app for better control during live meetings/lectures: <https://udenver.zoom.us/>

Textbook: *Environmental Chemistry: A global perspective*, 4th Edition
Van Loon and Duffy, Oxford University Press
E-book ISBN: 9780192522634 (suggested retail, \$43.48 for 180 day access) Print ISBN: 9780198749974 (sugg. retail, \$86.95)
E-book link: <https://redshelf.com/book/1062565/environmental-chemistry-1062565-9780192522634-gary-w-vanloon-stephen-j-duffy>
Amazon.com: <https://www.amazon.com/Environmental-Chemistry-perspective-Gary-vanLoon/dp/019874997X>
Also available from <https://www.bkstr.com/denverstore>

Overview message from Dr. Huffman regarding COVID-19 / remote teaching:

As you well know, many things in our world are different than they were just weeks ago. A part of that newness is that all courses at the University of Denver (and most universities in the country) will teach remotely for the entire Spring quarter. This is a new experience for you and for all of us. I have included a tentative schedule of dates of lectures, assignments, exams, and labs. I have also listed a break-down of grades. Normally I would hold very tightly to the schedule and all other details. Given the uncertainty in how we will all navigate this new educational medium, I am going to treat the schedule very loosely and I may change the schedule of topics or the number of assignments or exams given. It could be that we follow relatively closely, but it could also be that we will need to significantly alter any aspect of the plan. I will continue to communicate clearly via email, Canvas announcements, and by updating the schedule that I will keep posted on Canvas. We will all need to be flexible, however. I ask for your patience as we learn together how best to learn in this environment. I know you are likely under considerable additional stress during these strange weeks, and I will do my best to help support you as we go through this course. Please be quick to

initiate discussion with me no matter what I can help with – course content, confusion about the technical interface, or any other concerns.

I endeavor to deliver content through a variety of means, both synchronous (live) and asynchronous (recorded). I will do this to create as much of the interactive feel of a normal class as possible, while balancing the unique challenges associated with remote/online learning. In some cases I will lecture live via Zoom. In other cases I may pre-record lectures. Most laboratory experimental content will be provided pre-recorded or via reading, but TA Rachel Davey will likely also hold some live pre-lab lectures.

Despite the remote nature of the course, we will still be “conducting” laboratory experiments. This is an important part of the way the course was designed and is a critical piece of the learning objectives that must be met for both graduation requirements and for accreditation purposes. We have not had much time to adapt the labs so dramatically, and we will continue to put a detailed plan in place. When it seemed likely that physical access to the campus would be removed, we quickly arranged to record videos of the labs. We only got two finished before the official “stay at home” order was given by the mayor of Denver. Given that, the lab portion of the course will include a mix of: (i) pre-recorded videos + data, (ii) data sets from previous years, and (iii) environmental chemical data from local monitoring stations. A lab report will be required for each of the ~7 experiments.

One presentation assignment will be required for the course. This will require each student to work with a partner and to develop and deliver content using Zoom. The instructor will go over further details and help with technical details, but each student will be required to learn sufficiently about the medium in advance of the presentation.

The rest of the syllabus was partially adapted from previous years to this remote-learning process, but the flavor of some details will continue to change as adaptation is necessary.

COURSE DESCRIPTION

Introduction to Environmental Chemistry is designed as the third of three core chemistry requirements for environmental science or ecology majors, although it is expected that a handful of students with other majors and from other disciplines will be enrolled. The course is designed as a “survey” of topics in environmental chemistry; as such, we will not go into extreme detail on any one topic. The aim of the course is to introduce students to environmental chemistry issues and to expose ideas that will provide a basic framework to process complex issues that will face our world today and in coming years.

The course is comprised of both lecture and lab portions. One final grade will be assigned, weighted as a mix of the two portions. As a result, it is not possible to withdraw from lecture or lab independent of the other.

The course is not designed to be an upper division chemistry course; however, Dr. Huffman will assign assignments and tasks that will often be challenging and that may require significant effort and time. It is expected that during many weeks students should put in ~2-3 hours outside of class per course credit hour, which means ~6-9 hours outside of class per week on average. This will not always be the case, and some weeks will require more or less effort. Some topics are often cumulative, so please do not get behind.

LECTURE

The format of the class meetings will follow traditional lecture format on MWF. I will summarize new material and present illustrations and examples. For relevant sections of the course, you will be encouraged to practice problems after lectures. I will NOT be able to identify and describe every detail you read in the text and any supplemental materials. You will be expected to finish and understand assigned readings even if I have not gone over that material in great detail. However, I will emphasize important topics covered in the reading as well as problem solving strategies when appropriate. Please stop me at any time if you have questions.

OFFICE HOURS

I will post hours when I will be available in my (Zoom) office for questions or issues related, or unrelated, to the course. These hours may be changed, if necessary, during the quarter, but this will be announced.

READING

Reading sections will periodically be assigned and mentioned in lecture or posted via Canvas. You are encouraged to complete the assigned reading prior to the class lecture and often again after the lecture. In addition, you are also encouraged to attempt the example exercises throughout the text while completing the assigned reading. I recommend that you understand the material and how to solve the sample problems before proceeding to the next section.

GRADED ASSIGNMENTS

Weekly assignments will be required to be turned in for a grade. These may be homework assignments of problems taken from a book or may be more conceptual or literature-research driven in nature. Some assignments will be individual efforts and others will require group work. Homework problems will often be more difficult than exam questions in order to make you think.

For all assignments, it is very important that they are: (a) submitted as a single document per assignment in a standard document format, (b) typed or easily readable, (c) oriented in the correct way to be easily read (all pages). Assignments submitted without proper organization or clarity may be returned and may be counted as late and/or receive an additional grade penalty.

ASSIGNMENT LATE POLICY

Assignments will generally be due on Fridays at class time (9:00 am Colorado), via Canvas submission. Assignments will be considered on time if submitted before 9:05 am. 10% late penalty if submitted between 9:05 am 4:00 pm on the due date. 30% late penalty if turned in by 10 am Monday. Additional 30% per day.

EXAMS

Two (2) exams will be given during the quarter: one mid-term and one final exam. The dates of these exams will be given well in advance. **Under NO circumstances may the final be dropped or taken early.**

GRADES

Your final grade will be earned according to your performance on a mix of assignments from both the lecture and laboratory portions of the course. The table below lists a tentative estimate of the final break-down that will be used. Any changes will be announced in class. The final letter grade will be assigned based on the table of percentages listed here. I will not grade on a curve, but overall grade averages may be slightly increased if necessary in some cases.

Component	Points	Percentage
Participation	600	12%
Assignments	800	16%
Labs	800	16%
Presentation	600	12%
Mid-Term	1000	20%
Final Exam	1200	24%
<i>Total</i>	<i>5000</i>	<i>100%</i>

Letter Grade	Percentage
A	93.0 - 100
A -	90.0 - 92.9
B +	87.0 - 89.9
B	83.0 - 86.9
B -	80.0 - 82.9
C +	75.0 - 79.9
C	69.0 - 74.9
C -	65.0 - 68.9
D +	62.0 - 64.9
D	58.0 - 61.9
D -	55.0 - 57.9
F	< 54.9

IMPORTANT DATES

March 30: Classes begin, Spring Quarter

May 25: Memorial Day (No class)

June 5: Last day of classes

June 09 (Tuesday): Final Exam, 8:00 – 9:50 AM

REMOTE PARTICIPATION

During normal years, I do not grade for participation. Given the remote nature of the course, however, I have chosen to make “participation” (tentatively) worth 600 of the 5000 total course points (12%). Keep in mind the final details here may be adjusted based on how this works. The idea here is to keep you engaged, even though we are all in separate places. Points can be accrued in a variety of ways throughout the quarter but can total no more than the maximum points allocated to participation. The following is a suggested break-down of participation points. Note that there are way more points (by a factor of ~2.7) than you need to amass. This is made to make it much more flexible for you.

<u>Participation Points</u>	<u>Pts each</u>
Video introduction ¹	75
Live zoom lecture attendance	30
Live zoom lab attendance	30
Huffman office hours	15
Davey (TA) office hours	12
Group work video ² (max 2)	40

¹ Video introduction should be a minimum of 2 minutes, uploaded to Canvas, and introduce yourself to the instructor and TA. Otherwise the video will be confidential and will not be shared with the rest of the class. Clearly say your first and last names and consider introducing as much of the following as you are comfortable sharing:

(i) your major and year at DU, (ii) what city/state you will be living in during this remote quarter, (iii) concerns you have about the technical format of the course (including internet bandwidth or connectivity issues), (iv) thoughts or reasons for nervousness/excitement about the course content, (v) how the COVID-19 changes are affecting you and/or how stressed you are about this, (vi) feedback on how the first week of content delivery worked for you, (vii) do you plan to be attending lectures live or after recording? (not binding), and (viii) anything else you want to say that can help Dr. Huffman or Rachel get to know you.

² Group work video: This is an experimental idea with the intention of encouraging collaboration and interaction during this remote period. The video must be a minimum of 5 minutes and include between 2 and 5 students in the current course. The topic is up to you, as long as it is related to this course (i.e. group study session or session to work together on homework or lab report). A maximum of two of these videos can be counted for credit.

Videos must be submitted via Canvas and in all cases should clearly state the first and last names of everyone in the video (to allow for credit). They can be recorded using the Zoom platform (record button at the bottom) or any other software that allows recording of all participants.

RESTRICTION OF RECORDING, REPRODUCTION, AND DISTRIBUTION OF CONTENT

At the University of Denver, we protect the intellectual property of all our faculty, and safeguard the privacy of all our students in online learning environments. To this end, students may not record, reproduce, screenshot, photograph, or distribute any video, audio, or visual content from their online courses. This restriction includes but is not limited to:

- Pre-recorded and live lectures
- Live discussions
- Discussion boards
- Simulations
- Posted course materials
- Faculty feedback forms
- Visual materials that accompany lectures/discussions, such as slides
- Virtual whiteboard notes/equations, etc.

Videos of the live Zoom lectures **WILL** be recorded by the instructor and made available through the Canvas page. These videos are for the use of students in this section/year of the course only and may not be reproduced, shared in any way (including electronically or posting in any web environment) with those not in the class in that quarter.

Students who violate this policy will be reported to [The Office of Student Rights & Responsibilities](#) and may be subject to both legal sanctions for violations of copyright law **and disciplinary action under Student Rights & Responsibilities Policies**.

LECTURE AND TESTING ACCOMODATIONS

I will make every effort to accommodate students diagnosed with a learning disability. I will do this in complete confidence. I request that any student requiring these accommodations inform me the first week of class. For further information, please see the University Disability Services' website:

<http://www.du.edu/disability/dsp/index.html>.

RELIGIOUS ACCOMODATION

University policy grants students excused absences from class or other organized activities or observance of religious holy days, unless the accommodation would create an undue hardship. Faculty are asked to be responsive to requests when students contact them *in advance* to request such an excused absence. Students are responsible for completing assignments given during their absence, but should be given an opportunity to make up work missed because of religious observance.

Once a student has registered for a class, the student is expected to examine the course syllabus for potential conflicts with holy days and to notify the instructor by the end of the first week of classes of any conflicts that may require an absence (including any required additional preparation/travel time). The student is also expected to remind the faculty member in advance of the missed class, and to make arrangements in advance (with the faculty member) to make up any missed work or in-class material within a reasonable amount of time.

See: http://www.du.edu/studentlife/religiouslife/DU_religious_accommodations_policy.html

ACADEMIC DISHONESTY & STUDENT SUPPORT

While I advocate collaborative learning and teamwork, I also firmly believe that each individual should maintain the highest ethical standards in all of life's endeavors. As such, I support and will strictly enforce the Honor Code of the University of Denver. See links for specific links below:

Pioneer Pledge: <http://www.du.edu/studentlife/ccs/pledge.html>

Honor Code Statement: http://www.du.edu/studentlife/ccs/honor_code_2011-2012.pdf

I also understand that every student has unique personal and educational needs. I will do my best to help you learn or appropriately facilitate your ability to work through personal issues. Please see the Office of Student Life (<http://www.du.edu/studentlife/ccs/index.html>), including the Pioneer Care program (<http://www.du.edu/studentlife/care/>), for more detailed resources.

Introduction to Environmental Chemistry LAB
CHEM 2240-2,3
Spring Quarter, 2020

LAB MATERIALS AND REPORTS

- Reading material for labs will be uploaded to Canvas approximately one week prior to the lab.
- Pre-lab assignments will be required for each lab and **must be turned in by 4 pm on Tuesday preceding the lab via Canvas.**
- Post-lab reports will be due at the beginning of lab one week following the period when the lab was performed. The report for each experiment must be typewritten. Excluding the data, calculations, and graphs, the report should be a maximum of two single-spaced pages in length. Further details will be given on the first day of lab. The report shall include:
 - Title of the experiment
 - Your name and lab section
 - Date of experiment and due date
 - Introduction (statement of the problem and any applicable chemical equations)
 - Observations and data
 - Calculations
 - Results
 - Discussion and graphs
 - Conclusions
 - Post-lab questions and exercises

LATE POLICY

Late reports will be penalized 30% if delivered to the GTA at any point after the beginning of the lab period until Monday following the report due date. Reports will lose 60% if delivered by lab on Thursday the week following the report due date. Reports will not be accepted if delivered more a week after report due date.

GRADING

Total lab points =	800 points
Discretionary	30 pts (assigned by TA + instructor for lab & safety practices, notebook, technique)
Pre-lab assignments	10 pts per lab
Post-lab assignments	100 pts per lab
	x 7 labs = 800 points

Note that ability to concisely and cleanly articulate your message will affect your grade. Messy, disorganized, confusing, and incomplete reports will receive lower points. The TA and instructor each have discretion to levy point deductions if any guidelines are not followed.

Week #	Lecture #	Date	Week-day	Topic	Lecture Method	Lecture File(s)	Data / Suppl. File(s)	Reading Assignment	Homework Available Date	Homework Due Date	Lab Reports Available Date	Pre-Lab Date	Due Date
1	1	Mar 30	M	Syllabus, introduction, connection practice	Zoom (live)								
	2	Apr 1	W	Photochemistry				Ch. 2.1 - 2.2					
	3	Apr 2	Th										
	4	Apr 3	F	Stratospheric ozone I	Video			Ch. 3.1 - 3.2	HW1		L1		
2	5	Apr 6	M	Stratospheric ozone II				Ch. 3.3 - 3.4, 3.6 - 3.7		Video		PL1	
	6	Apr 8	W	Mixing ratios				Ch. 2.3 (first 3 pages), 9.3					
	7	Apr 9	Th										
	8	Apr 10	F	Atmospheric oxidation				Ch. 2.3 (cont'd)	HW2	HW1	L2		
3	9	Apr 13	M	Tropospheric smog				Ch. 4.1 - 4.2, 7.1				PL2	
	10	Apr 15	W	Acid rain I				Ch. 5.1 - 5.2					LR1
	11	Apr 16	Th										
	12	Apr 17	F	Acid rain II				Ch. 5.3 - 5.4	HW3	HW2	L3		
4	13	Apr 20	M	Activity coefficients								PL3	
	14	Apr 22	W	Ocean and water pH				Ch. 11.1 - 11.3					LR2
	15	Apr 23	Th										
	16	Apr 24	F	Oxidation potentials, pE				Ch. 9.2 (p. 235), 10.2	HW4	HW3	L4		
5	17	Apr 27	M	Polyprotic acid/base species								PL4	
	18	Apr 29	W	Nutrient cycles				Ch. 9.1					LR3
	19	Apr 30	Th										
	20	May 1	F	Particulate matter I				Ch. 15.1 - 15.3	HW5	HW4	L5		
6	21	May 4	M	Exam #1 (Lectures 1-12)				Ch. 6.1				PL5	
	22	May 6	W	Particulate matter II + organic groups									LR4
	23	May 7	Th										
	24	May 8	F	Greenhouse I				Ch. 8.1 - 8.2	HW6	HW5	L6		
7	25	May 11	M	Greenhouse II				Ch. 8.3				PL6	
	26	May 13	W	Climate I									LR5
	27	May 14	Th										
	28	May 15	F	Climate II					HW7	HW6	L7		
8	29	May 18	M	Climate III								PL7	
	30	May 20	W	Science and the median + Presentation tips									LR6
	31	May 21	Th										
	32	May 22	F	Water quality I				Ch. 16.1		HW7			
9	33	May 25	M	Memorial Day (No class)					HW8				
	34	May 27	W	Water quality II				Ch. 16.2					LR7
	35	May 28	Th										
	36	May 29	F	Nuclear energy I									
10	37	Jun 1	M	Nuclear energy II				Ch. 7.2					
	38	Jun 3	W							HW8			
	39	Jun 4	Th										
	40	Jun 5	F										
	41	Jun 9	Tu	FINAL EXAM, 8:00 - 9:50 AM									

* Pre-lab due Tuesday 4 pm