Atmospheric and Environmental Chemistry
CHEM:4873:0001
Spring 2021 Syllabus

I. Logistics

Instructor
Professor Betsy Stone
Chemistry Building W313
(319) 384-1863 (office)
betsy-stone@uiowa.edu

Class Time and Link
Tuesdays and Thursdays 11:00 AM – 12:15 PM
Online, via Zoom class link
Meeting ID: 932 7343 9526
Passcode: stone

Office Hours
Mondays 12:00 PM – 1:00 PM
Thursdays 3:30 PM – 4:30 PM
Fridays 9:30AM – 10:30 AM
Online, via Zoom office hour link
Meeting ID: 930 8383 2256
Passcode: stone

II. Course Description and Objectives

Course Description
Our study of environmental chemistry encompasses understanding i) natural chemical processes occurring in Earth’s air, water, and soil; ii) anthropogenic influences on the chemistry of the Earth, and iii) and the impacts of chemical changes to the Earth’s environment.

This course focuses upon fundamental chemical processes of importance in the atmosphere, soil, and water, with emphasis on kinetics and photochemistry of homogeneous and heterogeneous reactions, atmospheric structure and dynamics, global geochemical cycling, chemistry-climate relationships, environmental remediation strategies, and experimental methods in field and laboratory studies.

Course content is placed within a contemporary environmental context and examines current events, the ozone hole, air quality impacts on health, climate changes due to greenhouse gases and other climate forcers, persistent organic pollutants, and heavy metals in soils.
Learning Goals and Objectives

1. Explain the natural chemistry and chemical cycles of the atmosphere and hydrosphere.
2. Evaluate how anthropogenic activities impact the chemistry of Earth’s air, water, and soil.
3. Apply fundamental chemical concepts to describe the sources, sinks, transport, chemical transformations, and impacts of chemical hazards in the environment.
4. Analyze trends in environmental observations, the nature of interactions between the Earth’s cycles, and feedbacks occurring in the environment.
5. Predict the behavior of compounds in the environment, including their fate, transport, and reactivity.
6. Discuss contemporary issues, mitigation strategies, and technological solutions in air, water, and soil quality.
7. Professional development: Explain and discuss chemical concepts in contemporary examples; produce a research paper; and conduct peer review.

III. Course Content and Resources

Course Units

I. Atmospheric Chemistry
II. Energy and Climate Change
III. Water Chemistry and Water Pollution
IV. Toxic Organic Compounds
V. Solid State: Wastes, Soils, and Sediments

For a detailed, week-by-week list of lecture topics and reading materials, please see the Detailed Course Outline on ICON.

Textbook
(required)


Additional Readings

Additional readings will be posted or linked on ICON, including:


Intergovernmental Panel on Climate Change (IPCC) Assessment Reports. Online resource.
World Health Organization (WHO) Health Topics (e.g., Air pollution fact sheets).

**Course Website**
The course website is posted on ICON (http://icon.uiowa.edu). Login with your HawkID and password. Announcements, syllabus, assignments, and readings will be posted here. All assignments and written work must be submitted through ICON drop boxes. Please visit ICON frequently for announcements and updates that may contain pertinent and/or clarifying information.

**Academic Resources**
The University of Iowa Libraries (to access e-books and journal holdings), https://www.lib.uiowa.edu/

The Writing Center (for written document review and individualized instruction), https://writingcenter.uiowa.edu/un

The Speaking Center (for individualized instruction in oral communication), https://speakingcenter.uiowa.edu/

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### IV. Grading

#### Grading Scheme

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Perspectives project</td>
<td>125</td>
<td>(25%)</td>
</tr>
<tr>
<td>Current Events</td>
<td>125</td>
<td>(25%)</td>
</tr>
<tr>
<td>Problem sets</td>
<td>50</td>
<td>(10%)</td>
</tr>
<tr>
<td>Mid-term exam</td>
<td>100</td>
<td>(20%)</td>
</tr>
<tr>
<td>Final exam</td>
<td>100</td>
<td>(20%)</td>
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Final grades will be based upon points earned in the above categories. Plus or minus grades will be appended to letter grades. The grade of A+ will be awarded only in extraordinary circumstances.

**Perspectives Project** -

- **Perspectives article** (75 points): Following the requirements for Perspective articles in the journal *Environmental Chemistry & Technology (ES&T)*, write an article that reviews a research topic in environmental chemistry. Topics should be very focused, such as a single emerging pollutant. Articles should i) assess the current state of knowledge on the topic, ii) identify key recent advancements, and iii) identify future research that is needed. Articles are subject to a 2000 word limit, not including references and up to 6 visual elements.

- **Presentation** (25 points): A short (approximately 10 minute) presentation to the class on your article, including Q&A.

- **Peer-review of manuscripts** (15 points)

- **Participation in Q&A** (10 points)
Current Events – In groups of 1-2, students will lead and participate in online and in-class discussions on a current event in environmental chemistry related to the concurrent course unit.

- **Online introductory posts** will introduce the topic, summarize key chemicals and their properties or processes, and pose three discussion questions (25 points).
- **Online responses** to each event should address at a minimum: one of the three discussion questions posed and two responses to other posts (50 points, assessed throughout the semester).
- **Leading class discussions** involves briefly re-introducing the topic including perspectives from the online discussion and leading new discussion (25 points).
- **Participating in class discussions** by sharing ideas, asking questions, and answering questions related to the current event (25 points, assessed throughout the semester).

Problem Sets covering course content and will be assigned at regular intervals. They are designed to provide practice in key concepts and calculations and prepare students for exams. Additional problems from the textbook will be recommended, which should be used for practice.

Mid-term and final exams will be cumulative. Exams will be held on the dates noted below, with expectations and policies to be communicated separately.

Collaboration Policies

Collaboration among students is...
- Not allowed for exams, through which individual work is assessed.
- Allowed (and encouraged) in the form of verbal discussions for graded Problem Sets. Written and computational work should not be shared. All submitted work for grading must reflect the effort of the individual.
- Expected among partners collaboration on Current Events at 50% effort each.
- Facilitated in the form of peer-review for Perspectives articles. Additional collaboration on this project should be discussed in advance with the instructor.

Students are responsible for understanding this collaboration policies. If you have questions, ask for clarification.

Class Discussions

This course brings together people with a diversity of backgrounds, training, and experiences. To facilitate a productive discussion and to learn from this wide array of perspectives it is essential to treat each other with respect and to value each
other’s opinions. There will be times when people disagree during the course, but debate should be kept to the facts and the merits of the topic and not personal or mean spirited.

**Re-grading**

Adjustments to grades will only be considered within one week after an assignment or exam is returned. The re-grade request must be accompanied by a written, detailed description of the grading concern. Re-grading will involve re-assessment of the entire assignment and may increase or decrease of the grade.

**Attendance**

Attendance at class is required for Current Events and Perspectives presentations that have a graded participation component. Participation is strongly encouraged for all other classes. If you miss class on a required day, notify the instructor in advance by completing the [Explanatory Statement for Absence](mailto:betsy-stone@uiowa.edu) form and submitting it electronically to betsy-stone@uiowa.edu.

**Key Dates**

- Perspectives article (1st draft) April 8 at 11:00 AM
- Perspectives presentations April 20 and 22
- Perspectives article (final) April 30 at 11:00 AM
- Mid-term exam March 25
- Final exam TBA (held during Finals Week)

## V. Additional Academic, Social, and Financial Resources

**Chemistry Department**

The Chemistry Center (for issues related to course registration)

Chemistry Building E225

(319) 335-1341

Leonard MacGillivray (Departmental Executive Officer)

Chemistry Building E331

(319) 335-1350

**Career Resources**

The Graduate College (for financial assistance and funding opportunities, professional development, career planning, and one-on-one counseling through graduate success appointments)

Pomerantz Career Center (for leadership and career advancement at the undergraduate level)

**Other Resources**

Office of the Dean of Students Master Resource List (includes resources for emergency situations, mental health, sexual misconduct, illness/injury, academic issues, legal assistance, and other resources)

Office of Student Financial Aid (for information about financing your education)
### VI. College of Liberal Arts and Sciences Teaching Policies & Resources

<table>
<thead>
<tr>
<th>Policy Area</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Absences and Attendance</strong></td>
<td>Students are responsible for attending class and for contributing to the learning environment of a course. Students are also responsible for knowing course absence policies, which vary by instructor. All absence policies, however, must uphold the UI policy related to student illness, mandatory religious obligations, including Holy Day obligations, unavoidable circumstances, and University authorized activities (<a href="https://clas.uiowa.edu/students/handbook/attendance-absences">https://clas.uiowa.edu/students/handbook/attendance-absences</a>). Students should use the CLAS absence form to aid communication with the instructor who will decide if the absence is excused or unexcused; the form is located on ICON within the top banner under “Student Tools.”</td>
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<tr>
<td><strong>Academic Integrity</strong></td>
<td>All undergraduates enrolled in courses offered by CLAS have in essence agreed to the College's Code of Academic Honesty. Academic misconduct affects a student’s related grade and is reported to the College which applies an additional sanction including suspension. Outcomes about misconduct are communicated through UI email (<a href="https://clas.uiowa.edu/students/handbook/academic-fraud-honor-code">https://clas.uiowa.edu/students/handbook/academic-fraud-honor-code</a>).</td>
</tr>
<tr>
<td><strong>Accommodations for Disabilities</strong></td>
<td>UI is committed to an educational experience that is accessible to all students. A student may request academic accommodations for a disability (such as a mental health, attention, learning, vision, and a physical or health-related condition) by registering with Student Disability Services (SDS). The student is then responsible for discussing specific accommodations with the instructor. More information is at <a href="https://sds.studentlife.uiowa.edu/">https://sds.studentlife.uiowa.edu/</a>.</td>
</tr>
<tr>
<td><strong>Administrative Home of the Course</strong></td>
<td>The College of Liberal Arts and Sciences (CLAS) is the administrative home of this course and governs its add/drop deadlines, the second-grade-only option, and related policies. Other UI colleges may have different policies for courses offered by that college. CLAS policies may be found here: <a href="https://clas.uiowa.edu/students/handbook">https://clas.uiowa.edu/students/handbook</a>.</td>
</tr>
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</table>
Classroom Expectations

Students are expected to comply with University policies regarding appropriate classroom behavior as outlined in the Code of Student Life (https://dos.uiowa.edu/policies/code-of-student-life/). This includes related UI policies and procedures that all students have agreed to regarding the COVID-19 pandemic. Particularly, each student must wear a face mask when in a UI building, including a classroom. The density of seats in classrooms has been reduced, and in some instances, this will allow 6 feet or more of distance while other cases, it may be less. Regardless, wearing a face mask and maintaining as much distance as is possible are vital to slowing the spread of COVID-19. In the event that a student disrupts the classroom environment through the failure to comply with a reasonable directive of an instructor or of the University, the instructor has the authority to ask that the student to leave the space immediately for the remainder of the class period. Additionally, the instructor is asked to report the incident to the UI Office of Student Accountability, with the possibility of additional follow-up with the student. Students who need temporary alternative learning arrangements (TALA) for a future semester related to COVID-19 should visit this website for more information: https://coronavirus.uiowa.edu/temporary-alternative-learning-arrangements-tala.

Class Recordings:
Privacy and Sharing

Some sessions of a course could be recorded or live-streamed. Such a recording or streaming will only be available to students registered for the course. These recordings are the intellectual property of the faculty, and they may not be shared or reproduced without the explicit written consent of the faculty member. Students may not share these sessions with those who are not enrolled in the course; likewise, students may not upload recordings to any other online environment. Doing so is a breach of the Code of Student Conduct and in some cases is a violation of the Federal Education Rights and Privacy Act (FERPA).

Communication and the Required Use of UI Email

Students are responsible for official correspondences sent to the UI email address (uiowa.edu) and must use this address for all communication within or with UI (Operations Manual, III.15.2).

Complaints

Students with a complaint about an academic issue should first visit with the instructor or course supervisor and then with the Chair of the department or program offering the course; students may next bring the issue to the College of Liberal Arts and Sciences. See this page for more information: https://clas.uiowa.edu/students/handbook/student-rights-responsibilities.
### Final Examination Policies

The final exam schedule is announced around the fifth week of classes; students are responsible for knowing the date, time, and place of a final exam. Students should not make travel plans until knowing this information. No exams of any kind are allowed the week before finals with a few exceptions made for particular types of courses such as labs or off-cycle courses: [https://registrar.uiowa.edu/final-examination-scheduling-policies](https://registrar.uiowa.edu/final-examination-scheduling-policies).

### Nondiscrimination in the Classroom

The University of Iowa is committed to making the classroom a respectful and inclusive space for people of all gender, sexual, racial, religious, and other identities. Toward this goal, students are invited in MyUI to optionally share the names and pronouns they would like their instructors and advisors to use to address them. The University of Iowa prohibits discrimination and harassment against individuals on the basis of race, class, gender, sexual orientation, national origin, and other identity categories set forth in the University’s Human Rights policy. For more information, contact the Office of Equal Opportunity and Diversity ([https://diversity.uiowa.edu/eod](https://diversity.uiowa.edu/eod); +1 319 335-0705 or [diversity.uiowa.edu](https://diversity.uiowa.edu))

### Sexual Harassment

Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community must uphold the UI mission and contribute to a safe environment that enhances learning. Incidents of sexual harassment must be reported immediately. For assistance, please see [https://osmrc.uiowa.edu/](https://osmrc.uiowa.edu/).