

# CHEM 191: Issues in Environmental Chemistry

## Is clean air a right?

**Instructor:** Dr. Al Fischer, PhD

**Office Hours:** By appointment at [calendly.com/dralfischer](https://calendly.com/dralfischer); drop-ins welcome. (NS 209)

**Availability:** See my calendar at [alphonse.github.io/contact](https://alphonse.github.io/contact)

**Email:** [dfischer@wcu.edu](mailto:dfischer@wcu.edu)

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***Chem 191: Is clean air a right?*** is a freshman seminar course with an emphasis on atmospheric chemistry. The course is geared toward anyone with an interest in chemistry, atmospheric science, environmental science, public health, and/or engineering. Students will learn through a combination of lectures, workshops, discussions, and a semester-long project to construct and deploy Arduino-based atmospheric sensors. An emphasis will be placed on overarching concepts and problem-solving skills rather than rote minutia.

This course satisfies the first-year seminar requirement of the Liberal Studies Program. Note that student work from this class may be used for assessment of the Liberal Studies program. This course also counts toward the SL requirement for WCU's Lily Community Engagement Award (LECA).

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## Liberal Studies Learning Goals

- **Information Literacy:** Students will identify appropriate information sources and critically evaluate the credibility of those sources for relevance, legitimacy, and bias.
- **Inquiry:** Students will formulate focused questions and hypotheses that address atmospheric particulate matter, and explain and apply appropriate methods of inquiry to answer their questions.
- **Awareness of Impact:** Students will evaluate the impact of their own and others' actions on the human and natural worlds.

## Specific Learning Objectives

1. Describe the core principals of atmospheric literacy, as defined in the atmospheric literacy framework. (*Literacy, Awareness*)
2. Summarize how the scientific process works, both in theory and in practice. (*Literacy*)
3. Utilize SI units and scientific notation for course work. (*Literacy*)
4. Evaluate written documents for scientific rigor and accuracy. (*Literacy*)
5. Hypothesize how local conditions (industry, parks, homes, traffic, etc.) might affect atmospheric particulate matter. (*Inquiry, Awareness*)
6. Construct an air quality sensor to answer stated hypothesis using basic soldering and mechanical assembly techniques. (*Inquiry*)
7. Compose computer code to control and collect data with said air quality sensor. (*Inquiry*)
8. Collect data with the constructed air quality sensor. (*Inquiry*)
9. Interpret data from the air quality sensors to evaluate stated hypothesis and draw conclusions. (*Inquiry, Awareness*)
10. Describe how personal actions and local, national, and global laws affect human health, air quality, and climate on a local, region, and global level. (*Awareness*)
11. Evaluate the pros and cons of potential steps to remediate air pollution and/or climate change. (*Awareness*)

## Content Knowledge Themes

*We will work to understand the Atmospheric Science Literacy Framework:*

- Earth has a thin atmosphere that sustains life.
- Energy from the Sun drives atmospheric processes.
- Atmospheric circulation transports matter and energy.
- Earth's atmosphere changes over time and space, giving rise to weather and climate.
- Earth's atmosphere continuously interacts with the other components of the Earth System.
- We seek to understand the past, present, and future behavior of Earth's atmosphere through scientific observation and reasoning.
- Earth's atmosphere and humans are inextricably linked.

## Prerequisites

Students should be comfortable with algebra. A familiarity with chemistry and/or experience programming is helpful but not required.

## Required Course Materials

The following books are required and are either freely available online or available from the WCU bookstore and most other book sellers. *Additional required reading material will be posted on the Instructor's website and Blackboard.*

- *Chemistry: Atoms First*, Second Edition, OpenSTAX (Free Online)
- *Air Pollution and Global Warming*, Mark Z. Jacobsen, Cambridge University Press, ISBN: 978-1-107-69115-5. (WCU rental book)
- *The Atmosphere: A very short introduction*, Paul I. Palmer, Oxford University Press, ISBN: 978-0-19-872203-8 . (supplemental text, ~\$10)
- Free online material for discussion (TBA, items such as government reports, news articles, etc.)
- *WCU One Book*: WCU's 2019 One Book, *We Need to Talk* by Celeste Headlee, may be used for class activities. Students should read this book during the first portion of the semester.

## Technology

### Technology requirements

- A laptop computer with at least one standard USB-A port or, for computers without a USB-A port (e.g. newer MacBooks), an appropriate adapter.
- The Arduino integrated development environment (IDE) and Teensyduino add-on. These software are freely available from the developers for Mac OSX, Windows, and Linux.
- Though not *required*, a scientific calculator (not on a cell phone) may be useful. An acceptable calculator can be purchased for less than \$10. It should have the capability to do exponents and trigonometry.

Students will be provided with components to construct an air quality sensor, which must be returned at the end of the semester. Any student wishing to keep their sensor should purchase their own materials ahead of time (a bill of materials is available by request, total cost is about \$125).

### Personal technology use policies

The use of cell phones during lecture is prohibited; the sparing use of cell phones during workshop/lab sessions is permitted but discouraged. If you must, please use your cell phone outside the classroom.

In an effort to maintain a productive work environment for all students, please refrain from playing music, videos, etc., in the classroom.

## Field Trips and Field Work

The class will participate in a field trip to the Great Smoky Mountains National Park. All students attending the field trip will need to sign a waiver and turn it in to Diann Ferguson, Chemistry Department Administrative Support Associate, NS 231 **prior to** the field trip. Students who have not turned in a waiver will not be able to attend the field trip. Transportation to and from the field trip site will be provided. Students should remain with the group at **all times** during the field trip.

Field activities will be conducted at high elevations during October. Bring extra layers and a jacket even if you don't think you'll need them. Although hiking will be limited, students should come prepared with footwear appropriate for walking on trails. The field trip will occur **rain or shine**; students may wish to bring a rain jacket (recommended) and/or umbrella.

## Grading

**Conventions:** This course satisfies the first-year seminar requirement of the Liberal Studies Program. Work from this class may be used for assessment of the Liberal Studies program. Grading for all first year seminars adheres to the following scale: A, B, C, or U (unsatisfactory). The divisions of A+ (100-97), A (96.9-93), A- (92.9-90), B+ (89.9-87), B (86.9-83), B- (82.9-80), C+ (79.9-77), C (76.9-73), and U (<73) will be used in this course indicate gradations in quality from excellent to unsatisfactory. Students are responsible for knowing class attendance, withdrawal, and drop-add policies and procedures. A percentage breakdown of the final grade is given in the table below. If you are unsure of how to calculate your grade please inquire with your instructor.

Category	Weight
Participation and Attendance	10%
Classwork (Workshops, Labs, Quizzes)	15%
Homework	15%
Successful Sensor Build (+ return at end of semester)	10%
Technical Paper Detailing Sensor & Results	25%
Exams (Midterm + Final)	25%

**Assignment Submissions:** Students will be required to submit assignments electronically and as hard copies throughout the semester. Each assignment will state how it should be turned in. Unless otherwise specified, assignments are due at 23:59:59 on the due date or will be counted late.

- *For electronic assignments, follow these guidelines for full credit:*
  - A file submission URL will be provided for each assignment. Assignments submitted through said URL are visible only by the instructor.
  - Files should follow the convention **firstnameLastname\_\_assignmentName.xyz** or **group-name\_\_assignmentName.xyz**.
  - Files are sorted automatically by a computer. Therefore, **any files not named appropriately, not in the specified format, or submitted elsewhere will either incur point deductions or not be graded.**
  - Any electronic assignments turned in via hardcopy may not be graded.
- *For hardcopy assignments, follow these guidelines for full credit:*
  - Students will turn in a paper copy of the assignment either in class or to the instructor's office.
  - Students should answer on any provided worksheets and should not reformat the worksheet.
  - Any hardcopy assignments that are turned in electronically will not be graded.
  - Hard-copy assignments are due during class on the due date unless otherwise specified.

**Late Work:** Homework, lab assignments, and reports will be accepted up to 7 days late with a deduction of 5 points per day; no work will be accepted after 7 days (including weekends). Exams will not be accepted late.

**Grading Technology:** Some items may be graded by computer software. Any answers not in the specified format will not be graded. Written work may be checked for plagiarism using computer software. Plagiarism will NOT be tolerated (see policies in *Fine Print*, below). Due dates/times are computer-enforced and any files submitted after the deadline will be immediately counted late.

## The Fine Print...

### Course Policies

**Classroom Expectations:** The shared learning space of the college classroom is built on respect for each other and each other's learning. Learning together means our actions can intentionally and unintentionally distract others from their learning goals. As responsible learners who respect the rights of others and vow to minimize avoidable distractions such as: non-academic technology use, coming in late, sleeping, off-topic discussions, doing other homework, eating, etc.

**Attendance:** Please email your instructor *ahead of time* if you encounter circumstances that absolutely prevent you from making it to class on time. Attendance to all class periods is mandatory. Absences from group work sessions may incur a loss of points up to a zero for the assignment and deductions in the student's participation grade.

**Inclement Weather:** Please check the University website for campus closings during times of bad weather. Your safety is a priority when traveling. Use common sense when attempting to get to campus and notify your instructor if you are unable to safely make it. Announcements will be made via e-mail if class must be cancelled when the University has not officially closed.

**Composition-Condition Marks:** Proper mastery of the English language will be considered when assessing written work. A student whose written work fails to meet acceptable standards will be assigned a composition-condition (CC) mark by the instructor on the final grade report. All undergraduates who receive two CC grades prior to the semester in which they complete 110 hours at WCU are so notified by the registrar and are required to pass English 300 or English 401 before they will be eligible for graduation. This course must be taken within two semesters of receiving the second CC and must be passed with a grade of C (2.0) or better. Students needing assistance with writing are encouraged to get help from WaLC. All written work submitted for this class may be checked with SafeAssign.

**Civil Discourse at Western Carolina:** Consistent with WCU's core values and our campus creed, the WCU community accepts the freedoms and responsibilities of our shared community. WCU encourages all to clearly express their own views while at the same time seeking to understand the varieties of style, identity, and opinion that are held in any diverse community. In order for us to sustain a learning environment that promotes and values freedom of expression, we have a shared charge to accept personal responsibility for our actions, reactions, and speech, while seeking to learn from the actions, reactions, and speech of others.

### Institutional Policies

**Course Recording and Broadcasting:** Students may make visual or audio recordings (Recording) of any class related content, using any approved recording device (e.g., smart phone, computer, digital recorder, etc.) upon the **prior permission of the instructor** and subject to the following restriction(s). The Recording, along with the video capture of visible course materials (e.g., visible PowerPoint slides and/or visible lecture notes), shall be limited to the student's personal, course related, educational use and shall be subject to all applicable copyright laws and institutional policies. The student may not transfer, transmit, or otherwise disseminate the Recording to any third party, including classmates, without the permission of the instructor. Any violation of these restrictions, or any other restriction verbally communicated by the instructor, may subject the student to the provisions of the WCU Academic Integrity Policy, the WCU Code of Student Conduct or both.

**Accommodations for Students with Disabilities:** Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities and/or medical conditions. Students

who require accommodations must identify themselves as having a disability and/or medical condition and provide current diagnostic documentation to the Office of Accessibility Resources. Please contact the Office of Accessibility Resources, 135 Killian Annex (next to the One Stop), (828) 227-3886, by email, or at <http://accessibility.wcu.edu/>.

**Academic Integrity Policy and Reporting Process:** This policy addresses academic integrity violations of undergraduate and graduate students. Students, faculty, staff, and administrators of Western Carolina University strive to achieve the highest standards of scholarship and integrity. Any violation of the Academic Integrity Policy is a serious offense because it threatens the quality of scholarship and undermines the integrity of the community. While academic in scope, any violation of this policy is by nature, a violation of the Code of Student Conduct and will follow the same conduct process (see Article VII.B.1.a.). If the charge occurs close to the end of an academic semester or term or in the event of the reasonable need of either party for additional time to gather information timelines may be extended at the discretion of the Department of Student Community Ethics (DSCE).

Instructors have the right to determine the appropriate academic sanctions for violations of the Academic Integrity Policy within their courses, up to and including a final grade of “F” in the course in which the violation occurs.

Definitions:

- *Cheating:* Using, or attempting to use, unauthorized materials, information, or study aids in any academic exercise.
- *Fabrication:* Creating and/or falsifying information or citation in any academic exercise.
- *Plagiarism:* Representing the words or ideas of someone else as one’s own in any academic exercise.
- *Facilitation:* Helping or attempting to help someone to commit a violation of the Academic Integrity Policy in any academic exercise (e.g. allowing another person to copy information during an examination).

Undergraduate and Graduate Academic Integrity Process: Additional information is available on the Student Success website under Student Community Ethics: <http://www.wcu.edu/experience/dean-of-students/academic-integrity.aspx>.

## Student Resources

**Writing and Learning Commons (WaLC):** The Writing and Learning Commons (WaLC), located in Belk 207, writing tutoring and online writing and learning resources for all students. To view schedules and make appointments for any of these services, visit [tutoring.wcu.edu](http://tutoring.wcu.edu) or call 828-227-2274.

**Math Tutoring Center:** The Mathematics Tutoring Center (MTC) in Stillwell 455 provides drop-in tutoring for math courses and math-related content across the curriculum. Tutoring is available on a drop-in basis, MTWR 9:00am-9:00pm and Friday 9:00am-5:00pm. For more information, please visit <http://mtc.wcu.edu/> or contact us at 828-227-3830.

**Academic Calendar:** The University academic calendar can be found at [here](#). It includes dates for all breaks, University closures, final exams, etc.

**Final Exam:** The University final exam schedule can be found on the Registrar’s webpage.

## Syllabus Updates

This syllabus and the course schedule are subject to revision as needed. Students will be notified of changes and are responsible for adhering to the modifications.