The Air We Breathe:
What We Don't Know, Could …

Arts & Sciences 1137, Freshman Seminar
1 Semester-hour Credit
T, Th / Afternoon Location TBD

Instructor Name: Heather C. Allen **Office Hours: T & Th 4-6PM**
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Course Description

This Freshman Seminar presents the current state of our planet's atmosphere and how the molecules we breathe affect both air purity and our own health. Students will learn about air pollution and the molecules that play a pivotal role in clean air as well as in polluted air. Climate change (aka Global Warming) and air pollution are discussed from a historical perspective with commentary on key turning points in time from a scientific and, to some extent, a political perspective. The Earth's current air quality status with an understanding of fundamental scientific concepts will be presented, and discussed. In addition, the infamous Antarctic Ozone Hole will be discussed, and its relationship to Climate Change.

Students will be introduced to the most important molecules/chemicals in our atmosphere and how they cycle between different forms at different altitudes and how that impacts the air we breathe. No prior chemistry knowledge is required, although the basis of chemistry will be discussed. We will step outside several times during the 7-week term for pointed discussions about the air we breathe as it relates to current weather conditions and to our local environment with discussions of molecules produced by our trees in the Oval and emitted from road dust that borders our central campus.

Texts

There is no required text for this course; however, the instructor will provide weekly reading which will consist of journal articles from scientific journals and excerpts from scientific commentaries. You tube videos will also be assigned to view.

Course Policies

- The class will meet 2 times per week for 7 weeks.
- Class participation is expected as is on-time attendance.
- Students are required to hand in weekly homework assignments. Homework will consist of posing 2 questions based on the assigned reading or you-tube video viewing, and the completion of any additionally assigned problems.
- Students are also required to complete a final 1-page essay and to informally present an overview to the class.

You are expected to attend each class, have all the assigned materials completed, and to participate in class discussions. Prior to the start of each class, you should have written down at least two questions on the assigned readings or video viewings. These questions will add to our discussions. Evaluation of your participation is done by the quality of your questions and

comments. Homework assignments are to be handed in prior to the class start time.

The 1-page Journal Research Essay entails researching online an assigned topic, in the scientific literature, summarizing, commenting, and connecting to the prior class discussions. Guidance will be given in "how to" look up scientific journal articles. You will also give a short 5 minute informal overview of your Journal Research Essay, and your peers will have an opportunity to discuss the topic after your overview. The Journal Research Essay and the overview presentation will take place in the sixth and seventh weeks of the course.

Grading

Class participation:	50%
Weekly Homework:	30%
1-page Journal Research essay:	15%
5-minute Informal Oral Presentation of Research Essay:	5%

This course will use be graded – letter grade. Final grades: 90-93, 94-100 % = A-/A, 80-82, 83-86, 87-89% = B-/B/B+, 70-72, 73-76, 77-79% = C-/C/C+, 60-62, 63-66, 67-69% = D-/D/D+; below 60% = E

Academic Misconduct

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct (http://studentlife.osu.edu/pdfs/csc_12-31-07.pdf).

Students with Disabilities

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; http://www.ods.ohio-state.edu/.

Biographical Statement

Dr. Heather C. Allen is a Professor of Chemistry and Biochemistry, and a Professor of Pathology at the Ohio State University. She teaches at all levels from General Chemistry to Advanced Chemistry Topics, including a graduate level course in Atmospheric Chemistry. Her research is world acclaimed in the area of atmospheric processes at cloud droplet surfaces, specifically the understanding of charge accumulation and water structure. She also has a research program in laser optics, lung surface biophysics, and cancer detection. Thus, her perspective crosses the sciences, from the Earth atmosphere, to the Human body. Her training began in the California system of Colleges and Universities, where at the University of California, Irvine, she first conducted undergraduate research under the direction of the 1995 Nobel Laureate F. Sherwood "Sherry" Rowland, famous for his prediction of the Antarctic ozone hole.

Professor Allen has been twice nominated for an Undergraduate Research Mentor Award at the annual Denman Undergraduate Research Forum, and has also won several awards for mentoring, both for undergraduates and at the graduate level. In 2015, she won a national award for encouraging women into careers in the chemical sciences. She has also been recognized for many national and international research awards including the Camille Dreyfus Teacher-Scholar, Sloan, Beckman, American Association for the Advancement of Science, Ohio State Distinguished Scholar Award, and most recently, the Alexander von Humboldt Research Award from the German Humboldt Society.

Weekly Schedule

1. Our Atmosphere: The Veil of Protection
   Key concepts: Earth's Lower and Upper Atmosphere

2. Key Players: Chemicals of our Atmosphere
   Basics of Breathing, Disease, and Impact of Air Pollution Events

3. The Ozone Hole Revisited
   Solved Controversies: Past Perspective of the Ozone Hole Crisis

4. Climate Change Revisited: Hidden Agendas?
   New Controversies: How well do we listen?

5. Air Pollutants, Climate Forcers, and Policy
   Clean versus Dirty: Can We Survive the Next Century?

6. Hidden Opportunities of Scientific Discoveries: Pros and Cons
   Student Overviews

7. New Frontiers in Science: Chemicals and Chemistry Revisited
   Student Overviews
   Recap - Current Status of the Earth's Atmosphere; Where We Stand