

## AOSC 680: Introduction to Earth System Science

**Instructor:** [Ross Salawitch](mailto:rsalawit@umd.edu) (rsalawit@umd.edu)

**Fall 2024: Tues – Thurs 2:00 to 3:15 pm, Atlantic 2316**

**Websites:** <http://www.atmos.umd.edu/~rjs/class/fall2024> & <https://umd.instructure.com/courses/1367293>

### Required Text:

[Chemistry in Context: Applying Chemistry to Society](#) 7<sup>th</sup> Edition American Chemical Society  
(You can either purchase, rent a used copy from me for \$20 refundable upon return of the book, or use a password protected PDF file I'll provide to registered students)

[Paris Climate Agreement: Beacon of Hope](#) by Ross J. Salawitch *et al.* (freely available via open access)

[Atmospheres, Clouds, and Climate](#) by David Randall

[Climate and Oceans](#) by Geoffrey Vallis

[Climate and Ecosystems](#) by David Schimel and/or [Global Carbon Cycle](#) by David Archer

[The Cryosphere](#) by Shawn J. Marshall and/or [Paleoclimate](#) by Michael Bender

[Intro to Atmos Chem](#) by Daniel Jacob and/or [The Ends of the World](#) by Peter Brannen

Chapters from some of these six Princeton Primers in Climate books, available in various formats including paperback for less than \$30 each, will be the primary source for the student-led discussions. We may also select chapters from *Intro to Atmos Chem* (freely available via a password I shall provide) and/or *The Ends of the World* (\$17 on Amazon)

### Supplemental Text:

[Global Warming: The Complete Briefing](#) 5<sup>th</sup> Edition by John Houghton (selected readings will be provided)

**Course Description.** An introduction to the study of the earth as a system: atmosphere, oceans, land, cryosphere, solid earth, and humans. Cycling of materials and energy in the earth system: the energy cycle, the hydrologic cycle, the carbon cycle, the nitrogen cycle. Climate processes and variability: land-atmosphere, ocean-atmosphere, biosphere-climate, and human interactions, short- and long-term variability in climate. This class will be taught at a level appropriate for first year graduate students in Atmospheric and Oceanic Science.

**Prerequisites:** AOSC graduate student \*OR\* being advised by an AOSC Faculty Member \*OR\* permission of instructor.

**Class Philosophy:** We'll begin in a traditional format consisting of 8 or 9 lectures designed to provide a broad background to Earth System Science. This portion of class will make use of equations, at a level considerably simpler than you will see in the other AOSC Core classes. We will then transition to the *student led discussion part of class*, which will make use of four or more of the most excellent Princeton Primers in Climate series and related text. These readings, which consist of light equations, emphasize **fundamental understanding of concepts in Earth System Science**, which is the mantra of this class. Each book is available in a variety of formats, including paperback, for less than \$30 each.

**Grades:** Grades will be based on the problems set (10%), admission tickets (30%), one in class exam (20%), the student led presentation (20%), and each student's final research-project presentation (10%) & paper (10%). Students are required to write a research paper 6 to 8 pages long (single-spaced; length does not include figures or references) on a topic of their choosing related to the material covered in class. [All students will deliver two in class presentations](#): one based on a chapter or two selected from one of the required books in the *Princeton Primers in Climate* series or related textbooks (this will be an hour-long discussion) and the second based on a research project (this will be an 18 minute presentation).

### Course Topics

- How to Build a Habitable Planet: Geological Evolution of Earth's Atmosphere
- Overview of Global Warming
- The Greenhouse Effect: Radiative Transfer; Cloud and Water Vapor Feedbacks
- Climates of the Past
- Modeling of Earth's Climate
- The Global Carbon Cycle
- Biogeochemical Cycles of Methane and Nitrous Oxide
- Student led discussion of selected readings from some of the Princeton Primers in Climate (PPC) books (*Atmospheres, Clouds, and Climate* & *Climate and Oceans* almost certainly will be used) as well as some of the other PPC books and/or *Intro to Atmos Chem* or *The Ends of the World*



## **Policies and Resources for Graduate Courses**

It is our shared responsibility to know and abide by the University of Maryland's policies that relate to all courses, which include topics like:

- Academic integrity
- Student and instructor conduct
- Accessibility and accommodations
- Attendance and excused absences
- Grades and appeals
- Copyright and intellectual property
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Please see the University's website for graduate course-related policies at: <https://gradschool.umd.edu/course-related-policies>

### **Names/Pronouns and Self-Identifications:**

The University of Maryland recognizes the importance of a diverse student body, and we are committed to fostering inclusive and equitable classroom environments. You are invited, if you wish, to tell us how you want to be referred to in this class, both in terms of your name and your pronouns (he/him, she/her, they/them, etc.). Keep in mind that the pronouns someone uses are not necessarily indicative of their gender identity. Visit [trans.umd.edu](https://trans.umd.edu) to learn more.

Additionally, it is your choice whether to disclose how you identify in terms of your gender, race, class, sexuality, religion, and dis/ability, among all aspects of your identity (e.g., should it come up in classroom conversation about our experiences and perspectives) and should be self-identified, not presumed or imposed. Instructors will do their best to address and refer to all students accordingly and ask you to do the same for all of your fellow Terps.

### **Communication with Peers:**

With a diversity of perspectives and experience, we may find ourselves in disagreement and/or debate with one another. As such, it is important that we agree to conduct ourselves in a professional manner and that we work together to foster and preserve a virtual classroom environment in which we can respectfully discuss and deliberate controversial questions. You are encouraged to confidently exercise your right to free speech—bearing in mind, of course, that you will be expected to craft and defend arguments that support your position. Keep in mind that free speech has its limit and this course is NOT the space for hate speech, harassment, and derogatory language. Instructors will make every reasonable attempt to create an atmosphere in which each student feels comfortable voicing their argument without fear of being personally attacked, mocked, demeaned, or devalued.

Any behavior (including harassment, sexual harassment, and racially and/or culturally derogatory language) that threatens this atmosphere will not be tolerated. Please alert your instructor immediately if you feel threatened, dismissed, or silenced at any point during the semester and/or if your engagement in discussion has been in some way hindered by the learning environment.

## Academic Integrity

Some of your assignments may be collected via Turnitin on the course ELMS page. Instructors can choose to use this tool because it can help improve your scholarly writing and help verify the integrity of student work. For information about Turnitin, how it works, and the feedback reports you may have access to, visit [Turnitin Originality Checker for Students](#)

The University's Code of Academic Integrity is designed to ensure that the principles of academic honesty and integrity are upheld. In accordance with this code, the University of Maryland does not tolerate academic dishonesty. Please ensure that you fully understand this code and its implications because all acts of academic dishonesty will be dealt with in accordance with the provisions of this code. All students are expected to adhere to this Code. It is your responsibility to read it and know what it says, so you can start your professional life on the right path. **As future professionals, your commitment to high ethical standards and honesty begins with your time at the University of Maryland.**

It is important to note that course assistance websites, such as CourseHero, or AI generated content are not permitted sources, unless the instructor explicitly gives permission. Material taken or copied from these sites can be deemed unauthorized material and a violation of academic integrity. These sites offer information that might be inaccurate or biased and most importantly, relying on restricted sources will hamper your learning process, particularly the critical thinking steps necessary for college-level assignments.

Additionally, students may naturally choose to use online forums for course-wide discussions (e.g., Group lists or chats) to discuss concepts in the course. However, collaboration on graded assignments is strictly prohibited unless otherwise stated. Examples of prohibited collaboration include asking classmates for answers on quizzes or exams, asking for access codes to clicker polls, etc.

Finally, on each exam or assignment you must write out and sign the following pledge: ***"I pledge on my honor that I have not given or received any unauthorized assistance on this exam/assignment."*** If you ever feel pressured to comply with someone else's academic integrity violation, please reach out to the instructor straight away. Also, ***if you are ever unclear*** about acceptable levels of collaboration, ***please ask!***

## Netiquette Policy

Netiquette is the social code of online classes. Students share a responsibility for the course's learning environment. Creating a cohesive online learning community requires learners to support and assist each other. To craft an open and interactive online learning environment, communication has to be conducted in a professional and courteous manner at all times, guided by common sense, collegiality and basic rules of etiquette.

## Course Evaluation

Please submit a course evaluation through Student Feedback on Course Experiences in order to help faculty and administrators improve teaching and learning at Maryland. All information submitted to Course Experiences is confidential. Campus will notify you when Student Feedback on Course Experiences is open for you to complete your evaluations at the end of the semester. Please go directly to the [Student Feedback on Course Experiences](#) to complete your evaluations. By completing all of your evaluations each semester, you will have the privilege of accessing through Testudo the evaluation reports for the thousands of courses for which 70% or more students submitted their evaluations.

## Copyright Notice

Course materials are copyrighted and may not be reproduced for anything other than personal use without written permission.

## Resources & Accommodations

### Accessibility and Disability Services

The University of Maryland is committed to creating and maintaining a welcoming and inclusive educational, working, and living environment for people of all abilities. The University of Maryland is also committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs, or activities of the University, or be subjected to discrimination. The [Accessibility & Disability Service \(ADS\)](#) provides reasonable accommodations to qualified individuals to provide equal access to services, programs and activities. ADS cannot assist retroactively, so it is generally best to request accommodations several weeks before the semester begins or as soon as a disability becomes known. Any student who needs accommodations should contact the instructor as soon as possible so that they have sufficient time to make arrangements.

For assistance in obtaining an accommodation, contact Accessibility and Disability Service at 301-314-7682, or email them at [adsfrontdesk@umd.edu](mailto:adsfrontdesk@umd.edu). Information about [sharing your accommodations with instructors, note taking assistance](#) and more is available from the [Counseling Center](#).

### Student Resources and Services

Taking personal responsibility for your own learning means acknowledging when your performance does not match your goals and doing something about it. You are encouraged to visit [UMD's Student Academic Support Services website](#) to learn more about the wide range of campus resources available to you.

In particular, everyone can use some help sharpening their communication skills (and improving their grade) by visiting [UMD's Writing Center](#) and schedule an appointment with the campus Writing Center.

You should also know there are a wide range of resources to support you with whatever you might need ([UMD's Student Resources and Services website](#) may help). If you feel it would be helpful to have someone to talk to, visit [UMD's Counseling Center](#) or [one of the many other mental health resources on campus](#).

### Notice of Mandatory Reporting

Notice of mandatory reporting of sexual assault, sexual harassment, interpersonal violence, and stalking: As a faculty member, I am designated as a "Responsible University Employee," and I must report all disclosures of sexual assault, sexual harassment, interpersonal violence, and stalking to UMD's Title IX Coordinator per University Policy on Sexual Harassment and Other Sexual Misconduct.

If you wish to speak with someone confidentially, please contact one of UMD's confidential resources, such as [CARE to Stop Violence](#) (located on the Ground Floor of the Health Center) at 301-741-3442 or the [Counseling Center](#) (located at the Shoemaker Building) at 301-314-7651.

You may also seek assistance or supportive measures from UMD's Title IX Coordinator, Angela Nastase, by calling 301-405-1142, or emailing [titleIXcoordinator@umd.edu](mailto:titleIXcoordinator@umd.edu).

To view further information on the above, please visit the [Office of Civil Rights and Sexual Misconduct's](#) website at [ocrsm.umd.edu](http://ocrsm.umd.edu).

**Basic Needs Security**

If you have difficulty affording groceries or accessing sufficient food to eat every day, or lack a safe and stable place to live, please visit [UMD's Division of Student Affairs website](#) for information about resources the campus offers you and let me know if I can help in any way.

**Veteran Resources**

UMD provides some additional supports to our student veterans. You can access those resources at the office of [Veteran Student life](#) and the [Counseling Center](#). Veterans and active duty military personnel with special circumstances (e.g., upcoming deployments, drill requirements, disabilities) are welcome and encouraged to communicate these, in advance if possible, to the instructor.