

**EVSC 3300—Atmosphere and Weather**

Fall, 2023  
108 Clark Hall

**Robert E. Davis**

386B New Clark Hall  
924-0579 (office)  
924-7761 (Department)  
e-mail: red3u@virginia.edu

Office Hours:

Monday, 2:30 p.m.–4:00 p.m. (in person, no appointment necessary)

Wednesday, 11:00 a.m.–Noon (in person, no appointment necessary)

By appointment (if the above times don't work)

COURSE OUTLINE

Required Text:

*Understanding Our Atmospheric Environment* by Neiburger, Edinger, and Bonner  
(Second Edition). (Free on-line on class website.)

Recommended Text:

*Meteorology Today* by C. Donald Ahrens, Brooks/Cole. (Any edition will suffice).

Other Useful Atmospheric Sciences References:

*Meteorology for Scientists and Engineers* by Ronald B. Stull.

*Meteorology* by Danielson, E.W., Levin, J. and E. Abrams, McGraw-Hill.

These textbooks, and many others, are available in the library in Clark Hall and from the usual on-line sources.

Grading:

This course is divided into three fundamental areas: radiation, thermodynamics, and atmospheric fluid dynamics. There will be three examinations that will approximately coincide with each area. All three examinations will be given during regular class periods with the last exam on the last day of class. There will be no cumulative final examination. The exams will consist of a variety of questions: essay-type questions and objective-type multiple choice and short answer questions. The exam questions will be based almost entirely on the material presented in class; therefore, class attendance is essential if you are to obtain the information necessary for the exams.

Honor Policy: Given the availability of old exams, worked problem sets, and laboratory exercises that are increasingly becoming available from online services and other venues, the Environmental Sciences Department considers student access of these materials for Environmental Sciences courses, without explicit instructor permission, to be a violation of the UVa Honor Code. Similarly, artificial intelligence sources may not be used in the completion of any class assignments.

I will give you the option of determining how you wish to be graded in the course. There are four sources of points:

**Exams (3):** one each for section—radiation, thermodynamics, and fluid dynamics

**Problem sets (3):** same as above—one for each section

**In-class questions (daily):** I use Learning Catalytics to pose questions related to the topics we are covering in each lecture

You will need to sign up for a Learning Catalytics account ([learningcatalytics.com](https://learningcatalytics.com)). There is a nominal fee for the semester. You will then access these questions via the Learning Catalytics website on a computer, tablet, or smart phone, and your responses are updated simultaneously and recorded. You will receive 2 points for each correct answer, 1 point for an incorrect answer, and no points for not participating.

**Weekly quizzes (8–10):** Multiple choice open book/notes on-line quizzes that cover class content from the prior week

Quizzes will be set up in Canvas and will be organized such that they open and close on the same day each week. Expect about 7–10 questions each week that cover lectures from the prior week. You may use any sources (textbooks, notes, etc.) to answer these questions as long as you do your own work.

You must choose how you would like to be graded in this class. The four options are outlined below, with the percentage of points (out of 100 total for the course) in each category.

<b>Option</b>	<b>Exams</b>	<b>Problem Sets</b>	<b>In-class Questions</b>	<b>Weekly Quizzes</b>
A: exams/problems	25/25/25	8.3/8.3/8.3	X	X
B: exams/problems/ in-class questions	23/23/23	7/7/7	10	X
C: exams/problems/quizzes	23/23/23	7/7/7	X	10
D: everything	20/20/20	6.7/6.7/6.7	10	10

Everyone must take all three exams and complete all three problem sets. You have the option of being graded on the in-class questions, the weekly quizzes, or both.

Choose Option A if you tend to do well on exams and put off studying in earnest until prior to the exams, at which time you make the most progress in learning the material.

Choose Option B if you rarely miss lecture, take good notes, and find that you tend to learn material most easily in a lecture format.

Choose Option C if you are well-organized with deadlines, and if you like to learn as you go rather than cramming right before exams.

Choose Option D if you prefer to have a lot of assignments that have less impact on your grade rather than most of your grade riding on a few, larger assignments.

You must select your grading option for the class by no later than 11:59 p.m. on Tuesday, August 29 by going to the “Assignments” tab in Canvas and selecting “Course Grading Option Selection.” Simply enter your choice of Options A, B, C, or D. You may change your mind, but your decision is final as of Wednesday, August 30.

Your final course grade (out of 100%) will be scaled as follows:

A plus	≥ 93%
A	88–92
<u>A minus</u>	<u>84–87</u>
B plus	81–83
B	76–80
<u>B minus</u>	<u>73–75</u>
C plus	70–73
C	66–69
<u>C minus</u>	<u>62–65</u>
D plus	58–61
D	54–57
<u>D minus</u>	<u>50–53</u>
F	< 50%

*Extra credit is not available to in this course by doing additional work.*

Everyone should sign up for Learning Catalytics and participate in answering the questions in class, even if this is not part of your grade (i.e., if you do choose Option A or C).

The following is the examination schedule for this semester:

Exam #1	Friday, September 22
Exam #2	Friday, October 27
Exam #3	Monday, December 4

If you have any conflicts (officially sanctioned University academic or athletic activities) with the examination dates, I need to have that information well ahead of the exam date so alternative arrangements can be discussed with you and your coach/advisor. If you miss any of the exams without prior approval from me, you will receive a zero on the exam. *No make-up exams will be given.*

[THE EXAM SCHEDULE: I will not change the exam dates based upon our pace in the class, so please put these dates on your social/academic calendars and plan your activities accordingly. Conflicts with work/exams in other classes is no excuse. Plan your study schedule with these dates in mind.]

Website:

Almost all of the information related to this class will be posted on the class webpage. The address is:

<https://climate.evsc.virginia.edu/evsc-3300-home/>

Please bookmark it. Here you will find a lot of information about the course, including all of the websites that I access during lecture. (Also note that another course, EVSC 1300, has a link on the top right of the website, so be sure you have linked to the correct class.)

Labs:

Environmental Sciences majors are *required* to enroll in one of the four lab sections (EVSC 3301) associated with the class. Although your lab grade is separate from your course grade, information will be presented in the labs that is related to the lectures. Therefore, poor attendance or performance in the lab can adversely affect your course grade. Complete details of the lab requirements and lab grading policies will be outlined in your first lab session. Labs will begin the week of August 28.

Graduate Teaching Assistants:

Five teaching assistants are assigned to this course who are responsible for teaching and grading the labs, assisting in grading the problem sets, and helping you with any questions you have throughout the semester. Their office hours will be distributed with the lab syllabus during the first lab meeting and will be posted on the class web page once they are set. One of the T.A.s is specifically assigned to help with the lecture portion of the course, and this T.A. will be present for most of the lectures.

Weather Forecasting Contest:

For approximately the last half of the semester, we will have a weather forecasting contest in which all class members will make daily weather forecasts. The winners of this contest will receive a significant bonus in their course grade. Those who do not do as well will not be penalized. More details will be provided later in the semester.

## VARIOUS AND SUNDRY

### E-mail

E-mail will be the main way that I'll be communicating with you about the class, so please check it regularly for potential announcements, corrections, etc. I realize that some of you are not regular email users. Make checking email part of your daily routine. Also, feel free to contact me with simple questions as they arise. I'm not at all trying to discourage office visits, but often you might have a fairly straightforward question that can be easily handled via email. (<https://medium.com/@lportwoodstacer/how-to-email-your-professor-without-beingannoying-af-cf64ae0e4087#.sroi79ro7>)

### Teaching Assistants and Labs

Your T.A.s are generally capable of answering questions on the lectures as well as the labs. Please use them as a resource but don't abuse them. They have their own classes, projects, and research responsibilities in addition to teaching this class. Try to abide by their office hours as much as possible or make arrangements to meet them in advance rather than "popping by" their offices. Don't feel that you may only meet with the T.A. for your section.

We do the best we can to coordinate the labs and lectures, but a perfect correspondence is not possible with this course. I will not generally be able to answer specific questions on the lab exercises—seek out your T.A.s for advice on the labs.

### Irritants

Each of us has pet peeves. To be fair to you, I want to let you know mine at the outset. Don't come to class to sleep, post on social media, text your friends, etc. I will not hesitate to throw you out. I'm sure if our roles were reversed you would expect the same courtesy of me. The same applies to unnecessary conversations during lectures.

If you are sick and believe that you may be contagious, do not come to class. If you are unsure, please wear a mask. I'll promise to do the same.

### How to Do Well

I welcome questions during (and after) my lectures. For everyone who asks a question, there are three others silently thanking them.

The best thing you can do to excel in this course, aside from perfect attendance (in mind and body), is to continuously review your notes. A half-hour time investment a few days per week will do wonders when the time comes to begin studying in earnest. If you have questions, please don't wait until the week (or the day) before the exam—that may be too late. One of the beauties of this course is how it builds on previous knowledge. Loose ends are continuously tied along the way. The danger is that if you don't really understand radiation (the first section), you may very well have problems when you get to dynamics. It's very important that you keep up with the lectures.

## READING ASSIGNMENTS

Reading assignments will not be made in class, so you will be expected to keep up with the assigned readings on your own. I will provide page or chapter numbers on the slides so you can cross-reference each lecture with the book topics.

The purpose of this course is to provide a general overview of atmospheric sciences for environmental sciences majors. As such, this is not a typical junior-level meteorology course that you would find in many meteorology departments. We will focus on the basic physical principles and processes that are responsible for the observed behavior of the atmosphere. Wherever possible, the linkages of weather and climate to ecology, hydrology, geosciences, and atmospheric chemistry will be explored. (Key: N= Neiburger; A=Ahrens (12th edition))

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|----|---|--------------------|
| I. | ATMOSPHERIC COMPOSITION AND ENERGY                                  | N: Chapters 2, 3   |
|    | A. Atmospheric composition  | A: Chapters 1–3, 8 |
|    | B. Atmospheric structure  | pp. 196–208        |
|    | C. Electromagnetic spectrum   |                    |
|    | D. Radiation laws   |                    |
|    | E. Earth/Sun geometry—seasonal and diurnal disposition of radiation |                    |
|    | F. Earth’s energy balance—solar and terrestrial radiation           |                    |
|    | G. Global distribution of energy                                    |                    |

(Exam 1, Sept. 22, based on section I)

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|-----|---|--------------------|
| II. | THERMODYNAMICS  | N: Chapters 4–5, 1 |
|     | A. Ideal gas law (equation of state)                                | A: Chapters 5–7    |
|     | B. Hydrostatic atmosphere   |                    |
|     | C. First Law of Thermodynamics (heat, work, and temperature change) |                    |
|     | D. Dry air thermodynamics   |                    |
|     | E. Stability and the “parcel method”                                |                    |
|     | F. Moisture variables and humidity                                  |                    |
|     | G. Condensation   |                    |
|     | H. Fog formation  |                    |
|     | I. Phase changes of water, latent heat                              |                    |
|     | J. Moist air thermodynamics   |                    |
|     | K. Precipitation formation  |                    |
|     | L. Cloud formation  |                    |
|     | M. Cloud classification   |                    |
|     | N. Global precipitation   |                    |
|     | O. Hydrologic cycle   |                    |
|     | P. Evaporation, transpiration, and the climatic water budget        |                    |

(Exam 2, Oct. 27, based on section II)

- III. ATMOSPHERIC FLUID DYNAMICS N: Chapters 7–12  
A. Fundamentals: forces and winds A: Chaps. 8–12,16
1. Forces and their balance, Newton's Second Law
  2. Equations of motion
  3. Vertical motion, divergence, and vorticity
- B. Large-scale dynamics and the general circulation of the atmosphere
1. Global-scale circulation
  2. Mid-latitudes: air masses, fronts, cyclones, and anticyclones, frontal weather, upper-air circulation and the jet streams
  3. Tropical weather: tropical cyclones, monsoons

(Exam 3, Dec. 4, based on section III)

The material we cover is subject to change. I will let you know when and if we skip sections. Regardless of our pace, on the exams, you will only be responsible for the topics we covered in lecture.

**Disability accommodations:** If you anticipate or experience any barriers to learning in this course, please let me know. If you have a disability, or think you may have a disability, you may also want to meet with the Student Disability Access Center (<https://www.studenthealth.virginia.edu/SDAC>). If you have already been approved for accommodations through SDAC, please confirm that I have received this information.

**Discrimination, Harassment, Violence, and Retaliation:** Discrimination, harassment, and retaliation are defined in the University's Preventing and Addressing Discrimination and Harassment policy ("PADH Policy") and the Preventing and Addressing Retaliation policy ("PAR Policy"). The PAR Policy not only prohibits retaliation against individuals who complain of discrimination and harassment under the PADH Policy, but also those who assist or participate in a resolution of such a complaint (e.g., an investigative witness). Students and employees who believe that they have been subjected to discrimination, harassment, or retaliation under the PADH and/or PAR Policy should contact the EOCR office. You may report discrimination, harassment, and retaliation to the University through "Just Report It" ([justreportit.virginia.edu/](http://justreportit.virginia.edu/)) or by contacting the Office for Equal Opportunity of Civil Rights (EOCR) at (434) 924-3200 or [UVAEOCR@virginia.edu](mailto:UVAEOCR@virginia.edu) to speak with a member of the EOCR team.

The UVa faculty and administration are committed to providing a safe and equitable classroom environment. The University prohibits discrimination, including sexual and gender-based harassment and violence, on the basis of sex, sexual orientation, gender, and gender identity or expression in all of its programs and activities, including academics, employment, athletics, and other extracurricular activities. For more information, please see: [eocr.virginia.edu/title-ix](http://eocr.virginia.edu/title-ix), where you can also find information about procedures for resolving prohibited conduct. Those who believe that they, or someone else, have been subjected to the above forms of conduct are encouraged to contact the Title IX office at (434)-297-7988 or [titleixcoordinator@virginia.edu](mailto:titleixcoordinator@virginia.edu). You may also report prohibited conduct through "Just Report

It" or by contacting the Title IX office to speak with a member of the Title IX staff. The Title IX Policy and Procedures are also available at <https://eocr.virginia.edu/title-ix>.

In accordance with UVa policies, faculty are required to report any information disclosed by students regarding alleged acts of prohibited conduct to the Title IX Coordinator.

"Confidential Employees" are exempt from this requirement, and they include various licensed professionals who are not bound to disclose. You can find a listing of them here:

<https://eocr.virginia.edu/chart-confidential-resources>.

**Final note:** I will do my best to treat you as an individual with dignity and respect. By agreeing to take this course, you implicitly agree to abide by the rules set forth in this syllabus.