

ATM 210: Atmospheric Structure, Thermodynamics, and Circulation

Fall 2023

Version of 26 October 2023; check for updates

Class # 1134

Instructor: Prof. Robert Fovell (rfovell@albany.edu)

Personal Zoom: <https://albany.zoom.us/my/rfovell> (by prior arrangement)

Office: 404 ETEC

Office hours: Whenever I'm in my office, and by appointment

Course page: <http://www.atmos.albany.edu/facstaff/rfovell/ATM210/>

Class meetings: MWF 9:30-10:25 AM in ETEC B011

Zoom recordings: Live and archived recordings accessible via Brightspace. See disclaimer below

TAs: (Office hours subject to change.)

- Jade Cai (jcai5@albany.edu), 432 ETEC. Office hours: Tu 2-3:30, Th 10-11:30
- Rachel Eldridge (reldridge2@albany.edu), 424G ETEC. Office hours: MW 10:30-12:00

Contacting us: Especially for urgent communications, **email all three of us**

Required text: **NONE.** These are useful references:

- Ahrens and Henson, *Meteorology Today*, any recent edition (12th edition referenced below)
- Ahrens and Henson, *Essentials of Meteorology*, a similar (but softcover) book
- Fovell, *Meteorology: An Introduction to the Wonders of the Weather* (video), from The Great Courses

Class description: Technical survey of the atmosphere with application of elementary physical and mathematical concepts to the horizontal and vertical structure of the atmosphere; planetary, regional, and local circulations; weather systems; atmospheric radiation; precipitation physics and thermodynamics.

Learning outcomes: By taking this course you will be able to:

- Explain how atmospheric composition impacts the global energy balance of Earth's atmosphere
- Understand and discuss the various roles of water in our atmosphere
- Identify and explain the role of atmospheric forces in atmospheric phenomena at different weather and climate timescales
- Evaluate the role of atmospheric composition, water, and atmospheric forces in real world examples of atmospheric flow

Grading: A-E, with distribution as follows:

- Midterm exam 25%
- Homeworks 25%
- Quizzes 25%
- Final exam 25%

Exams: Midterm exam is expected to be **Friday, October 6**, during lecture. Final exam is **Monday, December 11, 1-3 PM**. The final is cumulative. **There are no makeup exams, except as allowable by University policy. Exams must be taken in person.**

Homeworks: There should be FOUR to SIX homework sets, **made available on the class web page**, and collected at or before **start of lecture on date due**. Homeworks handed on the due date but after start of lecture are penalized 25%; later submissions are penalized 50%. Homeworks will not be accepted after start of next lecture following due date, and/or after the time the answer key is posted, whichever comes earlier. If there are fewer than four homeworks, the homework contribution will still be 25%.

Quizzes: You can and should anticipate a quiz every Friday, at start of class, except on midterm exam day. **Post-midterm quizzes may be on any class day, may not be announced in advance, may be given at any time during class, and will represent in-class, self-corrected exercises.** Your lowest 2 quiz scores will be dropped.

Course outline (tentative and subject to change). “Ahrens” refers to *Meteorology Today*, any recent edition; “GC” refers to *Meteorology: An Introduction to the Wonders of the Weather* lectures.

- Overview. Temperature, pressure, and density. (Ahrens Ch. 1, 2; GC 1, 2)
- Atmospheric composition and origin (Ahrens Ch. 1; GC 3)
- Energy transfer, seasons, and the greenhouse effect (Ahrens Ch. 2; GC 4, 5)
- Local circulations: the sea-breeze and the Santa Ana wind (Ahrens Ch. 9; GC 6)
- Moisture and saturation (Ahrens Ch. 4, 5; GC 7, 8)
- Stability and instability (Ahrens Ch. 6, 7; GC 9, 10)
- Winds: forces and consequences (Ahrens Ch. 8; GC 11, 12)
- Global atmospheric circulation (Ahrens Ch. 10, 11; GC 13)
- Fronts and extratropical cyclones (Ahrens Ch. 11, 12; GC 14)
- Thunderstorms, tornadoes, and typhoons (Ahrens Ch. 14, 15; GC 18, 19, 21, 22)

Note: The reference textbooks and *Meteorology* video course include material not covered in class. Exams and quizzes will only reference material covered in class.

Accessibility and Accommodations: Please contact me early in the semester to arrange accommodations. If you need forms or information on accommodations, please visit the DRC; <http://www.albany.edu/disability/>

Absences:

- Class attendance is expected (and very highly encouraged).
- While we will attempt to provide access to live lectures and recordings via Zoom, technical difficulties may occur and Zoom malfunction or other problems will not serve as an acceptable excuse for late or missed classwork.
- Unavoidable, anticipated absences – including absences for religious observances – should be discussed with the instructor **in advance**, and arrangements should be made to make up missing work.
- For information on medically necessary absences, refer to http://www.albany.edu/health_center/medicalexcuse.shtml. Information regarding absences due to religious observance may be found here: <https://www.nysenate.gov/legislation/laws/EDN/224-A>.

Academic integrity: Students are responsible for doing their own work, and also responsible for being familiar, and complying, with the University's academic integrity standards. Refer to http://www.albany.edu/undergraduate_bulletin/regulations.html for more information.

Psychological health: If your distress is interfering with your relationships, academic, work, or daily life, confidential support is available to you. Contact Counseling and Psychological Services (CAPS) at 518-442-5800 or consultation@albany.edu to schedule an appointment with a psychologist. Virtual counseling services are available. The CAPS website (www.albany.edu/caps/) also contains self-help resources and other valuable information.