Introduction to Weather and Climate (ATS 350)

Basic Course Information

Course Name: Introduction to Weather and Climate - ATS 350

Semester: Fall 2025

Credits: 2 Hours

Prerequisites/Co-requisites: None

Meetings/Times: Tuesday / Thursday at 1:00-1:50 pm

Location: Chemistry Building - Room A103

Web: Class webpage is available on Canvas. Recorded lectures will also be available at this site.

Instructor Information

Instructors: Dr. Jennie Bukowski and Dr. Levi Silvers

Emails: jennie.bukowski@colostate.edu; levi.silvers@colostate.edu

Graduate Teaching Assistant: Ann-Casey Hughes (hughesao@colostate.edu)

Office Hours Location: Scott Building - Room 301 (Odyssey Design Studio)

ATS 350 - Office Hours / Student Hours: Tuesday & Thursday at 12-12:45 pm and by appointment

ATS 351 - Office Hours / Student Hours: Mondays at 12:30-1:30 pm and by appointment

Communication Policy: We will try to respond to emails within 24 hours

Course Materials

Textbook / Course Readings

Ahrens/Henson's Meteorology Today: An Introduction to Weather, Climate and the Environment (13th Edition). All the readings will be from this book. Please purchase the hard copy rather than the digital edition.

Course Description & Objectives

The successful student will gain a broad process-level understanding of meteorology and climate that will enable the student to converse intelligently about current events related to weather extremes and climate change. In particular, students will:

1. Be able to define basic quantities used to measure the state of the atmosphere
2. Understand the different ways heat moves through the atmosphere and surface to determine temperature
3. Understand how and why temperature differs depending on location on Earth

4. Understand the different phases of water in the atmosphere, how water vapor is measured, and how it contributes to clouds and precipitation
5. Be able to explain what is meant by a stable and unstable atmosphere
6. Be able to explain what is meant by pressure and how to read a pressure map
7. Understand what makes the wind blow at different space scales
8. Be able to explain why ocean currents exist
9. Understand the different types of weather we experience in Colorado and their mechanisms
10. Be able to explain how increasing greenhouse gases in the atmosphere contribute to a warming planet, and the consequences of this warming
11. Be able to explain conceptually complex topics related to weather and climate
12. Be able to explain the difference between weather and climate

Discussion of Course

This course will survey atmospheric processes with an emphasis on those related to the weather and climate. Lectures will be presented from both descriptive and conceptual viewpoints that will include the physics that drives the described phenomena. Although this course is not necessarily mathematically rigorous; an equation will occasionally be used to supplement the text.

We will bring discussion of the current weather into the lectures, particularly as interesting events unfold. Students will gain an understanding of the processes involved that cause certain local weather phenomena.

Since the course steadily builds on previous material, it is important to understand what's happening as we proceed. Ask questions when you don't understand something, particularly questions regarding basic concepts. It is very important that you read the text, since we can’t possibly cover all the material needed for exams during lectures and assignments. Reading assignments include all of the chapters referred to in the syllabus (below). At least 2 hours of effort are expected to complete readings and homework assignments outside of class for each hour of class time.

We will have homework assignments designed to build understanding of the material, including some multiple-choice questions and some brief open-ended responses. There will not be an assignment in the same week as an exam.

Drs. Bukowski and Silvers will be available during office hours (or by appointment). The TA, Ann-Casey, will hold office hours to address questions encountered during the lecture, related to the assignments, and in studying for the exam.

Your grade will be derived from points received on homework assignments, three midterm exams, and one final exam. There will be no makeup midterm or final exams, unless circumstances are extraordinary.

Course Schedule

Weekly Homework Assignments: Due Fridays 11:59 pm (except when there is an exam)

Exam 1: Thursday, September 25

Exam 2: Thursday, October 23

Exam 3: Tuesday, November 18

Final Exam: Tuesday, December 16, 6:20-8:20 pm

WEEK	DATE	TOPIC	TEXTBOOK	INSTRUCTOR
1	8/26	Introduction, structure of the atmosphere, pressure	Chapter 1	Silvers
2	9/2	Density, temperature, energy, radiation	Chapters 1,2	Bukowski
3	9/9	Selective absorption, greenhouse effect, globally averaged energy balance	Chapter 2	Silvers
4	9/16	Variation of energy balance with latitude, seasons, regional control of temperature	Chapters 2,3	Silvers
5	9/23	Water vapor, relative humidity, wet bulb temperature	Chapter 4	Bukowski
		Exam 1: Thursday, September 25		
6	9/30	Condensation, dew, fog, and clouds	Chapters 4,5	Bukowski
7	10/7	Stability	Chapter 6	Silvers
8	10/14	Rain/snow formation, pressure, pressure maps	Chapters 7,8	Bukowski
9	10/21	Horizontal balance of forces, wind	Chapter 8	Silvers
		Exam 2: Thursday, October 23		
10	10/28	Scales of motion, sea breeze, orographic flow	Chapter 9	Bukowski
11	11/4	Monsoons, atmospheric general circulation	Chapters 9,10	Silvers
12	11/11	General circulation of the atmosphere and ocean, El Nino	Chapter 10	Silvers
13	11/18	Thunderstorms, tornadoes, hurricanes, severe weather	Chapters 14-16	Bukowski
		Exam 3: Tuesday, November 18		
14	11/25	**Fall Break: No Class Tuesday & Thursday**		
15	12/2	Weather forecasting, climate change	Chapters 13,18	Bukowski
16	12/9	Climate change	Chapter 18	Silvers
		Final Exam: Tuesday, December 16, 6:20-8:20 pm		

Course Policies (late assignments, make-up exams)

There will be no makeup midterm or final exams, unless circumstances are extraordinary.

No late homework will be accepted.

Because life sometimes throws us unexpected challenges, we will drop a single homework with your lowest grade.

Grading Policy

Your grade for this class will be based upon the following:

- Homework assignments – 20%
- 3 midterm exams - 20% each
- 1 final exam - 20%

Total numerical scores may also be curved at the end of the class before final grades are assigned. Grades assigned for the class include: A+, A, A-, B+, B, B-, C+, C, D, F. CSU does not use grades of C-, D+, or D-.

GRADE	RANGE
A+	100% to 96.67%
A	<96.67% to 93.33%
A-	<93.33% to 90.0%
B+	<90.0% to 86.67%
B	<86.67% to 83.33%
B-	<83.33% to 80.0%
C+	<80.0% to 76.67%
C	<76.67% to 70.0%
D	<70.0% to 60.0%
F	<60.0% to 0.0%

CSU Principles of Community

Inclusion: We create and nurture inclusive environments and welcome, value and affirm all members of our community, including their various identities, skills, ideas, talents and contributions.

Integrity: We are accountable for our actions and will act ethically and honestly in all our interactions.

Respect: We honor the inherent dignity of all people within an environment where we are committed to freedom of expression, critical discourse, and the advancement of knowledge.

Service: We are responsible, individually and collectively, to give of our time, talents, and resources to promote the well-being of each other and the development of our local, regional, and global communities.

Social Justice: We have the right to be treated and the responsibility to treat others with fairness and equity, the duty to challenge prejudice, and to uphold the laws, policies and procedures that promote justice in all respects.

Additional Information and Policies

The linked page provides policies relevant to your courses and resources to help with various challenges you may encounter: