INTRODUCTION TO WEATHER AND CLIMATE (ATS 350, 2 hrs)

Instructor: Professor and Department Head Eric Maloney (he/him/his)
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Maloney's Office Hours: Virtual: Monday 3-4:30
Follow the Zoom link in Canvas or below.
In-Person (Engineering A 102E): Tue, 12-1 pm
And by appointment

Communication Policy: Responses to emails will be provided within 24 hours, although often much sooner.

Graduate teaching assistant:
Nicole June (she/her/hers)
Email: Nicole.June@colostate.edu
Nicole's Office Hours (Engineering A 102F): Tuesday 2-4 PM and Thursday 12-1 PM.

Text: Ahrens/Henson's *Meteorology Today: An Introduction to Weather, Climate and the Environment* (13th Edition). All the readings will be from this book.

Classroom: 120 Engineering, Tu Thu @ 1:00-1:50 pm. The class is offered in face-to-face format. Recorded lectures will be made available on Canvas

Web: Class webpage is available on Canvas. Captured lectures will also be available at this site. The Zoom link we will use for Maloney's office hours is located here:

Zoom Link:
https://zoom.us/j/5348210795
Meeting ID: 534 821 0795

Contact hours: 2

Student Learning Goals and 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 in simple terms
12) Be able to explain the difference between weather and climate in simple terms

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), and will generally follow this syllabus. Read Chapter 1 as soon as possible. *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.

Maloney is available during office hours (or by appointment). The TA, Nicole June, will hold office hours (above) 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. Frequent in-class discussion and other similar participation by students will be rewarded with 'extra credit' up to 1% of the total course grade. There will be no makeup midterm or final exams, unless circumstances are *extraordinary*.

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

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

Grades assigned for the class include: A+, A, A-, B+, B, B-, C+, C, D, F.

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 does not use grades of C-, D+, or D-.

There will be some curving of scores for each individual exam or assignment. Total numerical scores may also be curved at the end of the class before final grades are assigned.

Lecture Topics (and Chapters):

Week 1: Introduction, structure of the atmosphere, and pressure (Chapter 1)
Week 2: Density, temperature, energy, radiation (Chapters 1,2)
Week 3: Selective absorption, greenhouse effect, globally-averaged energy balance (Chapter 2)
Week 4: Variation of energy balance with latitude, seasons, regional control of temperature (Chapters 2, 3)
Week 5: Water vapor (Chapter 4), **1st Exam**
Week 6: Relative humidity, wet bulb temperature, clouds (Chapters 4 and 5)
Week 7: Stability (Chapter 6)
Week 8: Rain/snow formation, pressure, pressure maps (Chapters 7, 8)
Week 9: Horizontal balance of forces (Chapter 8)
Week 10: Scales of motion, sea breeze, orographic flow, **2nd Exam** (Chapter 9)
Week 11: Monsoons, atmospheric general circulation (Chapters 9, 10)
Week 12: Atmospheric general circulation, ocean general circulation, El Nino (Chapter 10)
Week 13: 3rd Exam, Thunderstorms and Severe Weather (Chapter 14)
Week 14: Climate Change (Chapter 18)

FALL BREAK: November 25-29

Week 15: Climate Change (Chapter 18)

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

1st Exam, Thursday, September 19.
2nd Exam, Thursday, October 24.
3rd Exam, Tuesday, November 12.
Final Exam, Wednesday, December 11, 6:20-8:20 pm

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.

Respect for Diversity:
It is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. In addition, if any of our class meetings conflict with your religious events, please let me know so that we can make arrangements for you

Statement on Academic Integrity
This course will adhere to the CSU Academic Integrity Policy as found in the General Catalog (http://catalog.colostate.edu/general-catalog/policies/students-

responsibilities/#academic-integrity) and the Student Conduct Code (https://resolutioncenter.colostate.edu/student-conduct-code/). At a minimum, violations will result in a grading penalty in this course and a report to the Conflict Resolution Services and Student Conduct Services.

CSU Policies and Resources:

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