

GGGS 670 Spring 2025

Introduction to Atmosphere and Weather

Syllabus

Course Information:

Title: GGGS 670 Introduction to Atmosphere and Weather

Time: In person 04:30 pm-5:45 pm, Asynchronous online 01/21-05/14/2025

Location: Exploratory Hall 2312

Instructors: Prof. John Qu

Telephone: (703) 993-3958

Office: Room 2412 Building: Exploratory Hall

Office Hour: Stop by 2:00-4:00PM Thursdays or make appointment vs Zoom

Course Description:

This course introduces students to the fundamental principles of atmospheric sciences, providing a quantitative description and interpretation of various atmospheric phenomena, with a focus on sub-synoptic scales (i.e., weather and regional-scale climate). A key goal of the course is to not only offer foundational knowledge of atmospheric science and weather but also to prepare students for understanding climate science. It is designed for both science majors and non-majors taking their first course in atmospheric science and climate change.

Prerequisites

College Math (such as MATH 214) and physics (such as PHYS 262), or permission of instructor.

Final project:

Weather and atmosphere science related final presentations and final term papers are encouraged.

Grading:

Grades will be based upon your performance on the homework exercises, midterm, class attendance and final term paper and presentation. The weighted contribution of each of these items to your final grade is given below:

Homework 30%

Midterm 25%

Final term paper 35% Class attendance 10%

(A=90-100, B=80-89, C=70-79, D=60-69, F=<60)

Textbook:

Required Textbook: None

Recommended References:

1: Wallace, J. M., and P. V. Hobbs, Atmospheric Science: An Introductory Survey (Second Edition), Academic Press, 2006.

2. Ackerman, A. Steven and John A. Knox "Meteorology: Understanding the Atmosphere",

Fourth Edition, by 2014, Jones & Bartlett Learning (2014), ISBN 978-1-284-02737-2 (paperback edition), 575 pages

3. Qu, J.J. and R. P. Motha, Climate Change and a Sustainable Earth, 2022, Cambridge Scholars Publishing (<https://www.cambridgescholars.com/product/978-1-5275-8044-2>)

Honor code: Students are required to adhere to the GMU Scholastic Honor Code. Please show respect to everyone in the classroom. Copying homework or quizzes is considered cheating.

Detailed Schedule

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| Week one | Introduction to the Atmosphere |
| Week two | The Energy Cycle |
| Week three | Energy Balance and Temperature |
| Week four | Water in the Atmosphere |
| Week five | Observing the Atmosphere/ Atmospheric Forces and Winds |
| Week six | Global and Small-Scale Winds |
| Week seven | Atmosphere-Ocean Interactions: El Niño and Tropical Cyclones |
| Week eight | Spring break |
| Week nine | Mid-term |
| Week ten | Guest lecture and Air Masses and Fronts |
| Week eleven | Extratropical Cyclones and Anticyclones |
| Week twelve | Thunderstorms and Tornadoes |
| Week thirteen | Weather and Climate Forecasting |
| Week fourteen | Past, Present and Future Climate |
| Week fifteen | Final project presentations |
| Week sixteen | Final term papers (May 8 th , 2025) |