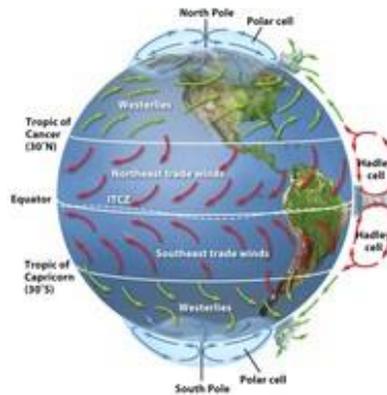


GGG 670 Spring 2026

Introduction to Atmosphere and Weather



Course Information:

Title: Introduction to Atmosphere and Weather

CRN: 12383

Time: 04:30 pm-5:45 pm, Thursdays (in-person), 01/20-05/13/2026

Location: Exploratory Hall 2312

Online sessions (Asynchronous)

Instructor: Prof. John Qu (jqu@gmu.edu),

Telephone: (703) 993-3958

Office: Room 2412, Building: Exploratory Hall

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

Course Description:

This course introduces students to the physical foundations of atmospheric science, emphasizing the fundamental laws and processes that govern the behavior of the atmosphere within the Earth system. The course provides quantitative descriptions and physical interpretations of a wide range of atmospheric phenomena, with particular attention to sub-synoptic scales, including weather systems and regional-scale climate variability. A central goal of the course is to build a solid understanding of the core physical principles—such as radiation, thermodynamics, fluid dynamics, and atmospheric moisture processes—that underlie weather and climate. These foundations are essential for interpreting atmospheric observations and for understanding the scientific basis of climate variability and climate change. Designed for both science majors and non-majors taking their first course in atmospheric science, the course places special emphasis in Spring 2026 on extreme weather and climate phenomena, including heatwaves, droughts, and extreme precipitation, and examines them through a physically based, Earth-system perspective. Applications of artificial intelligence (AI) in weather and climate education are also discussed in this course.

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 25%

Midterm 30%

Final Project 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. Ackerman, Steven A. and John A. Knox "Meteorology: Understanding the Atmosphere", Fourth Edition, 2014, Jones & Bartlett Learning (2014), ISBN 978-1-284-02737-2 (paperback edition), 575 pages.
- 2: Wallace, J. M., and P. V. Hobbs, Atmospheric Science: An Introductory Survey (Second Edition), Academic Press, 2006.
- 3: "Climatology", By Robert V. Rohli, Anthony J. Vega, Jones & Bartlett Learning (2011), Paperback - 432 pages - ISBN 0763791016

Honor code:

Students must follow the GMU Scholastic Honor Code. Please show respects to everyone in the classroom. Copying homework (or quiz) is considered cheating.

AI (Artificial Intelligence) Statement

Large language model generative artificial intelligence (generative AI) tools, such as ChatGPT, Gemini, Grok, and others, have recently emerged and become available for wide use. While generative AI tools can offer inspiration and new possibilities, they should not be seen as unacknowledged substitutes for the content created by students in their courses. More detailed information can be obtained from the

following websites (<https://stearnscenter.gmu.edu/knowledge-center/ai-text-generators/> and <https://ctl.utexas.edu/chatgpt-and-generative-ai-tools-sample-syllabus-policy-statements>)

Detailed Course Schedule

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
Week six	Atmospheric Forces and Winds
Week seven	Global and Small-Scale Winds (No in person session) Mid-term
Week eight	Spring break
Week nine	Atmosphere-Ocean Interactions: El Niño and Tropical Cyclones
Week ten	Air Masses and Fronts (DL)
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 7th, 2026)