

CLIM-112/PHYS-112, Syllabus
Introduction to Fundamentals of Atmospheric Science Laboratory
(Laboratory for CLIM-111/PHYS-111)
Fall Semester, 2023
Instructors: Zafer Boybeyi & Michael Summers
TA: Noah Blanco-Alcala
Tentative Syllabus - Updated: 11 August 2023

Introduction:

CLIM-112/PHYS-112 (1-credit lab course) and CLIM-111/PHYS-111 (3-credit lecture course) are a coordinated paired course and cross-listed under Department of Atmospheric, Oceanic & Earth Sciences and Department of Physics & Astronomy. CLIM-112/PHYS-112 is designed to enhance learning with practical applications by applying the information acquired in CLIM-111/PHYS-111, "Introduction to Fundamentals of Atmospheric Science". The students will engage in activities that are designed to expand and enrich the learning process through the exercises for weather and climate, scientific observations and their analysis that illustrate the complex phenomena that occur in the Earth's atmosphere.

General Goals:

- The overarching goal of this lab is the development of the basic processes that control the state and behavior of the Earth's atmosphere (e.g., clouds physics and precipitation, atmospheric heating and cooling processes, atmospheric dynamics, climate change and human influences).
- This course is also designed to help students to develop their essential analytical and quantitative scientific reasoning skills in the context of atmospheric science.

Specific Goals:

- An overview of the important physical and dynamical processes which control the state, variability, and evolution of the Earth's atmosphere.
- An understanding of the key scientific discoveries and remaining unanswered questions in atmospheric science.
- An overview of the primary scientific concepts encountered in atmospheric science, e.g., the role of thermodynamics, the greenhouse effect, heating and cooling, atmospheric motions, and climate change.
- An understanding of the application of the scientific method to analyze and interpret observations of components of the atmospheric system.

Learning Outcomes:

By the end of the semester students will be able to demonstrate a basic understanding of:

- Why atmospheric temperature varies across the Earth and in the vertical
- Solar influences and related heating which drive atmospheric thermodynamics and motions
- Earth's energy budget
- Atmospheric moisture and its role in stability considerations

- Atmospheric condensation and its role in cloud formation & precipitation
- Air parcel concept, lifting air & adiabatic processes
- Atmospheric forces & force balances
- Atmospheric motions & circulations
- Terrain effect
- Air masses & fronts
- Weather producing mid-latitude cyclones
- In-situ observations & weather maps
- Weather analysis & forecasting
- Greenhouse gases effect
- The climate system, variability & climate controls

Mason Core General Education Course:

CLIM-112/PHYS-112 is part of the general education program at GMU and satisfies the requirements of the Mason Core for natural science courses!

Mason Core course purpose:

“The general education natural sciences courses engage students in scientific exploration; foster their curiosity; enhance their enthusiasm for science; and enable them to apply scientific knowledge and reasoning to personal, professional and public decision-making.”

The central objectives of the Mason Core are to help the student:

- (1) Understand how scientific inquiry is based on investigation of evidence from the natural world, and that scientific knowledge and understanding:
 - evolves based on new evidence
 - differs from personal and cultural beliefs
- (2) Recognize the scope and limits of science.
- (3) Recognize and articulate the relationship between the natural sciences and society and the application of science to societal challenges (e.g., health, conservation, sustainability, energy, natural disasters, etc.).
- (4) Evaluate scientific information (e.g., distinguish primary and secondary sources, assess credibility and validity of information).
- (5) Participate in scientific inquiry and communicate the elements of the process, including:
 - Making careful and systematic observations
 - Developing and testing a hypothesis
 - Analyzing evidence
 - Interpreting results

CLIM-112/PHYS-112 is designed to help students to understand the scientific process and to develop their scientific reasoning skills in the context of atmospheric science.

The main goals of the CLIM-112/PHYS-112 include showing the student how atmospheric scientists have come to know what they know about the Earth’s atmosphere. The student will learn that this is accomplished by the study of the light from the sun that heats the atmosphere and biosphere, and by the study of how the atmosphere responds to the sun’s heat in terms of temperature changes, compositional changes, and dynamical changes. This satisfies the **Mason**

Core objective (1).

Atmospheric science is an applied science. As such it continually strives to understand more and more about how the atmosphere is changing and of the causes of those changes, both natural and anthropogenic, as we learn more and more about how the atmosphere operates. That satisfies **Mason Core objective (2).**

Students will learn about the nature of the Earth, and how the state of the Earth is changing as a result of both natural and human-caused processes, and how scientists have summarized these effects. This satisfies **Mason Core objective (3).**

Students will also learn about the methods by which science operates, in particular how careful evaluation of observational evidence drives scientific progress. The student will learn how scientists evaluate and present scientific evidence. This satisfies **Mason Core objective (4).**

And finally, students will be performing exercises for weather and climate, analyzing scientific observations, and interpreting the results. This satisfies Mason Core (5).

Instructors and Contact Information:

Prof. Zafer Boybeyi

Research I, Room 217

Mail Stop 6C3

Email: zboybeyi@gmu.edu

Office Hours: Mondays and Wednesdays, 9:00-10:30am (Appointment Required!)

Prof. Michael E. Summers

Professor of Planetary Sciences and Astronomy

Planetary Hall, Room 235

Email: msummers@gmu.edu

Office Hours Tuesdays 1:00-2:00pm (Appointment Required!)

Course Website:

GMU Blackboard: <https://gmu.blackboard.com/>

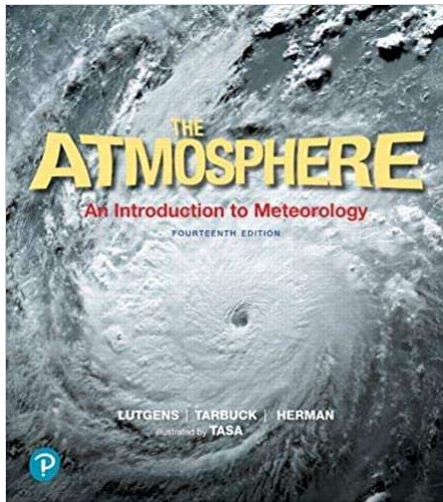
In order to comply with student privacy laws, faculty and students need to use their GMU e-mail accounts when corresponding with each other.

Required Textbook:

The Atmosphere: An Introduction to Meteorology, Plus Mastering Meteorology with Pearson eText -- Access Card Package (14th Edition)

by [Frederick K. Lutgens](#) (Author), [Edward J. Tarbuck](#) (Author), [Redina Herman](#) (Author), [Dennis G. Tasa](#) (Author)

- **YOU MUST HAVE THE 14TH EDITION OF THE TEXTBOOK! OLDER EDITIONS HAVE DIFFERENT INFORMATION AND MATERIAL IS IN A DIFFERENT ORDER.**



Laboratory Module Format:

1) Background Lecture:

- An overview of relevant background material.
- Laboratory Exercises

Including exercises for weather and climate, scientific observations and their analysis.

The instructions for the lab exercises will be posted on GMU Blackboard.

Laboratory Modules:

- **Laboratory modules must be completed within one week from the time that the laboratory module was assigned.**
- **Laboratory modules submitted more than 1 WEEK late will be subject to a 10% grade penalty.**
- **Laboratory modules will not be accepted more than 2 WEEKS LATE!**

Tentative Schedule for Laboratory Exercises:

Orientation

Lab 1: Composition and Structure of the Atmosphere

Lab 2: The Atmospheric Energy Budget

Lab 3: Atmospheric Moisture

Lab 4: Saturation and Atmospheric Stability

Lab 5: Cloud Droplets and Raindrops

Lab 6: Atmospheric Motions

Lab 7: Weather Map Analysis

Lab 8: Mid-latitude Cyclones

Lab 9: Thunderstorms and Tornadoes

Lab 10: Hurricanes

Lab 11: Climate Controls

Lab 12: Climate Variability & Climate Change

Important Notes:

- **Attendance Policy:** Students **MUST ATTEND** all labs.
- If you are **ABSENT OR LATE** to lab, you will not be brought up to speed on the Introduction.

Makeup Policy:

- Makeup labs will be permitted with an acceptable explanation.
- Makeup labs **must** be scheduled **IN ADVANCE** with instructor permission.

Important Lab Dates:

- Orientation Lab Meeting: Monday, August 22, at 1:30-4:15pm EST
- First Lab Assignment: Monday, August 29

Lab Grading Policy:

- 10-12 Lab Exercises 90%
- Participation 10%

Numerical Grade Ranges:

A	94-100%
A-	90-93%
B+	87-89
B	83-86%
B-	80-82%
C+	77-79
C	73-76%
C-	70-72%
D	60-69%
F	Below 60%

Technology:

Cell phones and other communicative devices are not to be used during class. Please keep them stowed away and out of sight. Laptops or tablets may be permitted for the purpose of doing the lab only. Engaging in activities not related to the course (e.g., gaming, email, chat, etc.) will result in a significant reduction in your participation grade.

Safe Return to Campus:

Students are required to follow Mason's current policy about facemask-wearing. As of August 20, 2022, masks are optional. If this policy changes, you will be informed; however, students who prefer to wear masks either temporarily or consistently will always be welcome in the classroom.

Campus Closure:

If the campus closes, or if a class meeting needs to be canceled or adjusted due to weather or other concern, students should check Blackboard [or other instruction as appropriate] for updates on how to continue learning and for information about any changes to events or assignments.

Blackboard:

Activities and assignments in this course will regularly use the Blackboard learning system, available at <https://mymason.gmu.edu>. Students are required to have regular, reliable access to a computer with an updated operating system (recommended: Windows 10 or Mac OSX 10.13 or higher) and a stable broadband Internet connection (cable modem, DSL, satellite broadband, etc., with a consistent 1.5 Mbps [megabits per second] download speed or higher. You can check your speed settings using the speed test on this website.)

Academic Integrity:

The integrity of the University community is affected by the individual choices made by each of us. Mason has an Honor Code with clear guidelines regarding academic integrity.

Three fundamental and rather simple principles to follow at all times are that:

- (1) all work submitted be your own;
- (2) when using the work or ideas of others, including fellow students, give full credit through accurate citations; and
- (3) if you are uncertain about the ground rules on a particular assignment, ask for clarification.

No grade is important enough to justify academic misconduct. Plagiarism means using the exact words, opinions, or factual information from another person without giving the person credit. Writers give credit through accepted documentation styles, such as parenthetical citation, footnotes, or endnotes. Paraphrased material must also be cited, using the appropriate format for this class. A simple listing of books or articles is not sufficient. Plagiarism is the equivalent of intellectual robbery and cannot be tolerated in the academic setting.

To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of the George Mason University community and with the desire for greater academic and personal achievement, we, the student members of the University Community have set forth this:

Student members of the George Mason University community pledge not to cheat, plagiarize, steal, or lie in matters related to academic work.

If you have questions about the meaning of the honor code, please ask me. I expect you to hold to this standard by doing your own work on tests and assignments. If you have questions, please contact the Office of Academic Integrity. They provide information on the honor code and resources for students and faculty.

Classroom conduct:

Discussions, whether face-to-face or electronic, should be conducted with respect for each other and at a high level of civil discourse. Disruptive behavior may result in a student being asked to leave the classroom or be temporarily barred from participating in online activities.

Religious Holidays and Observations:

<http://ulife.gmu.edu/calendar/religious-holiday-calendar/> is available to help minimize difficulties for students of different faiths. It is the student's responsibility to speak to the

instructor in advance should their religious observances impact their participation in class activities and assignments.

Additional Resources for Students:

Students with Disabilities:

Disability Services at George Mason University is committed to upholding the letter and spirit of the laws that ensure equal treatment of people with disabilities. Under the administration of University Life, Disability Services implements and coordinates reasonable accommodations and disability-related services that afford equal access to university programs and activities. Students can begin the registration process with Disability Services at any time during their enrollment at George Mason University. If you are seeking accommodations, please visit <http://ds.gmu.edu/> for detailed information about the Disability Services registration process. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email: ods@gmu.edu | Phone: (703) 993-2474

Diversity and Inclusion:

The College of Science seeks to create a learning environment that fosters respect for people across identities. We welcome and value individuals and their differences, including gender expression and identity, race, economic status, sex, sexuality, ethnicity, national origin, first language, religion, age and ability. We encourage all members of the learning environment to engage with the material personally, but to also be open to exploring and learning from experiences different than their own.

Sexual Harassment, Sexual Misconduct, and Interpersonal Violence:

Notice of mandatory reporting of sexual or interpersonal misconduct: As a faculty member, I am designated as a “Non-Confidential Employee,” and must report all disclosures of sexual assault, sexual harassment, interpersonal violence, stalking, sexual exploitation, complicity, and retaliation to Mason’s Title IX Coordinator per University Policy 1202. If you wish to speak with someone confidentially, please contact one of Mason’s confidential resources, such as Student Support and Advocacy Center (SSAC) at 703-993-3686 or Counseling and Psychological Services (CAPS) at 703-993-2380. You may also seek assistance or support measures from Mason’s Title IX Coordinator by calling 703-993-8730, or emailing titleix@gmu.edu.

Privacy:

In order to comply with student privacy laws, faculty and students need to use their GMU email accounts when corresponding with each other and the instructor. I will not respond to messages sent from or send messages to a non-Mason email address.

Student Use of Classroom Materials:

Some kinds of participation in online study sites violate the Mason Honor code: these include accessing exam or quiz questions for this class; accessing exam, quiz, or assignment answers for this class; uploading of any of the instructor's materials or exams; and uploading any of your own answers or finished work. Always consult your syllabus and your professor before using these sites.

Counseling and Psychological Services:

Offers faculty and staff consultation about how to help students that experience difficulties that impact their learning, including how to respond to students in crisis. In particular, the Mason Cares, faculty referral guide, and students of concern are primary resources for faculty and staff. Students can take advantage of psychological services, a variety of learning services, multicultural services, and educational programs that support students' educational goals.

Mason Student Services Center:

Provides one-stop, integrated information and referrals regarding admissions, registrar, student accounts, and financial aid.

Student Health Services:

Provides high quality health care, counseling, education, and prevention services in support of student learning and retention.

University Life:

Enhances students' in- and out-of-class experiences, in addition to facilitating interactions among faculty, staff, and other students. These resources help students achieve academically, stay healthy, get involved with campus life, find jobs, and identify resources to enrich their learning.

Religious Holidays and Observations:

<http://ulife.gmu.edu/calendar/religious-holiday-calendar/> is available to help minimize difficulties for students of different faiths. **It is the student's responsibility to speak to the instructor in advance should their religious observances impact their participation in class activities and assignments.**

REMINDERS:

- **PLEASE SIGN YOUR EMAILS!!!!!!!!!!!!!!**
- **THIS SYLLABUS IS TENTATIVE**
- **YOU ARE RESPONSIBLE FOR ATTENDING THE LABORATORY SESSIONS, AND KNOWING IF CLASS OR SCHEDULE CHANGES ARE ANNOUNCED.**
- **OFFICE MEETINGS MUST BE SCHEDULED IN ADVANCE**
- **YOU MUST BUY THE CORRECT EDITION OF MASTERING METEOROLOGY**

Instructions for Registration for the CLIM-112/PHYS-112



| Mastering | Meteorology

Student Registration Instructions

To register for **Introduction to Fundamentals of Atmospheric Science Lab**:

1. Go to <https://mlm.pearson.com/enrollment/boybeyi52360>
2. Sign in with your Pearson student account or create your account.
For Instructors creating a Student account, do not use your instructor credentials.
3. Select any available access option, if asked.
 - » Enter a prepaid access code that came with your textbook or from the bookstore. »
 - Buy instant access using a credit card or PayPal.
 - » Select **Get temporary access without payment for 14 days**.
4. Select **Go to my course**.
5. Select **Introduction to Fundamentals of Atmospheric Science Lab** from My Courses.

If you contact Pearson Support, give them the course ID: boybeyi52360

To sign in later:

1. Go to <https://mlm.pearson.com>
2. Sign in with the same Pearson account you used before.
3. Select **Introduction to Fundamentals of Atmospheric Science Lab** from My Courses.

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