

SYLLABUS VERSION 1.0
ATMOSPHERIC PROCESSES
GEOP 5306-001 (CRN 18708) / GEOL 6315-006 (CRN 19937)
FALL SEMESTER 2022

Instructor: Dr. Tom Gill **Office:** GEOL 401A. **Phone:** 915-747-5168. **email:** tegill@utep.edu.

Course hours: Tuesday/Thursday 3:00 – 4:20 PM

Office hours (tentative, may be changed): Mon and Wed 1PM- 2PM, and by appointment.

Appointments are encouraged. I may not be able to assist you outside of office hours without an appointment!

Course web site: on Blackboard.

Course Description: Investigation of the physical principles upon which weather and climate are based, to provide an interpretation of atmospheric phenomena and an introduction to physical and dynamical meteorology. Topics include physical and chemical bases of atmospheric phenomena, the role of the atmosphere in the earth system, and the processes causing atmospheric motions, precipitation, and Earth's climate. Prerequisite: graduate standing in science or engineering; knowledge of calculus and physics is expected, though will not necessarily be heavily used during the semester.

This course is designed for graduate and doctoral level science or engineering majors with no previous coursework in atmospheric physics or dynamics. In this course, we will show how the basic principles of physics, chemistry, and other sciences can be used to understand the properties and behavior of the atmosphere, many meteorological/weather processes, and the Earth's climate system in a semi-quantitative fashion as well as practically. Since there are other courses at UTEP covering air quality and air pollution, this class will not *focus* on that topic, although it will be discussed.

Text: Atmospheric Science: An Introductory Survey, 2nd Edition, by John M. Wallace and Peter V Hobbs (International Geophysics Series Vol. 92), Elsevier/Academic Press, 2006, ISBN 0-12-732951-X.

Make sure you have the Second Edition, published in 2006!

Students should access and bookmark the publisher's web site companion for the book:

<http://www.elsevierdirect.com/companion.jsp?ISBN=9780127329512>

Students will also make use of the COMET Meteorological Education web site. All students will need to register at <https://www.meted.ucar.edu/registration.php> first to be able to access the educational modules at the COMET Site. When you register, please make sure to enter Dr. Gill's email address (see above) in the box "supervisor/instructor email," and check the box stating "yes, my progress and quiz results may be shared with my employer, organization or institution," in order to receive credit for assignments through this site.

Students may also wish to have access to a basic introductory undergraduate-level textbook on weather and/or climate or introductory meteorology (such as those used for GEOG 3306 and ESCI 3308 courses) Students will also be required to familiarize themselves with scientific journals and publications in the atmospheric sciences, from which additional readings will be assigned.

Course Objectives: A three-credit one-semester course in itself cannot rigorously cover all aspects of atmospheric science in detail, but will be at least sufficient to impart to the student a background survey of scientific knowledge of the atmosphere. **For a more detailed understanding, each week's lectures here in this class would be covered by an entire semester's class in another university's Atmospheric Science department required for atmospheric science or meteorology majors!**

By successfully completing this course, you will be able to:

- 1) Gain a better understanding of meteorological and atmospheric terminology and phenomena;
- 2) Better understand the interaction and effects of the atmosphere on other earth systems;
- 3) Understand some of the sub-disciplines of atmospheric science, and their inter-relationships;
- 4) Gain a basic understanding of the physical principles guiding atmospheric motions and Earth's climate system; and
- 5) Describe weather phenomena in terms of physical and chemical processes;

Course Format, Attendance and Grading: This class will include lecture, reading and homework assignments, tests, potential laboratory/field exercises, and opportunities for individual research. The course schedule will not be written in stone (maybe in air?) because *every opportunity will be taken to utilize the actual literal atmosphere of El Paso outside the classroom to illustrate concepts, terms, and phenomena. When interesting or illustrable weather is occurring or observable in the local area, we will take time to observe, discuss, illustrate, and explain what is happening through the principles of atmospheric science.* Guest lectures from practicing or trained atmospheric scientists may be incorporated into the class. Attendance will not be taken but is strongly encouraged; part of the grade will be based on class participation and discussion, and much of the material discussed in lecture will NOT be in the book and vice versa. The final grade will be based on:

15% Final project/paper

5% Class participation

40% Homework, exercises, and related assignments

40% Test(s) during the semester including final.

Individual Semester Project/ Term Paper

(oral presentation AND 6 – 10 page written paper on a topic required of all graduate students): Topic to be determined by mutual consent of both the student and the instructor. Deadline: Topics to be determined before Tuesday, November 1, at the latest.

Oral presentation to the class, required of all graduate students: given as if it were a presentation to a scientific meeting. Approximately 20 minutes presentation + 5 minutes for discussion (length will depend on final class enrollment and time available). To accompany presentation: 6 to 10 pages of text (single spaced, 1" margins) *excluding* up to 2 pages of additional figures or diagrams, summarizing the topic, with at least twenty key references (references must be from the scientific literature, not non-peer-reviewed papers or web pages).

Add/Drop Deadlines:

Sept 7th – Fall Census Day. This is the last day to register for classes (College Approval Required). Payments are due by 5:00 pm.

Oct 28th - Fall Drop/Withdrawal Deadline. Note: Student-initiated drops are permitted after this date, but the student is not guaranteed a grade of W. The faculty member of record will issue a grade of either W or F.

Please email Professor Gill ASAP if you are unable to complete course requirements or need temporary accommodations due to COVID-19 or another illness or health issue. Dr. Gill reserves the right to move the course online temporarily or permanently due to COVID precautions.

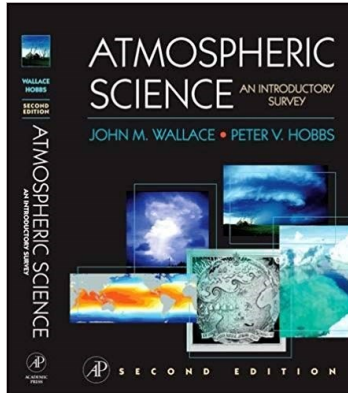
COVID-19 PRECAUTIONS: Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms or otherwise feeling ill. If you are feeling unwell, please let Professor Gill know as soon as possible, so that we can work on appropriate accommodations. If you have tested positive for COVID-19, you are expected to report your results to covidaction@utep.edu, so that the Dean of Students Office can provide you with support and help with communication with your professors. The Student Health Center provides COVID-19 testing; additionally, UTEP runs a larger testing site with the city of El Paso on campus. For more information, go to <https://www.utep.edu/resuming-campus-operations/testing/> .

WEARING MASKS IN CLASS: We cannot mandate that you wear a mask while in class, but Dr. Gill requests that you do so given the highly contagious nature of the current variants of COVID-19 and Dr. Gill's medical conditions. Unfortunately, vaccination does not prevent infection and illness with the current variant of SARS-CoV-2, although vaccination is extremely helpful in preventing serious illness. The CDC currently recommends that we ALL wear masks in indoor spaces. A simple single cloth mask or surgical mask is no longer recommended given the new variants of COVID: a N95 mask is recommended. If you are not yet vaccinated, please visit <https://www.epcovidvaccine.com>. Being vaccinated (with booster shots), wearing masks, and social distancing are the

most effective measures we have to keep one another safe. We recommend that you space yourselves out from each other in the classroom. FYI: your professor is fully vaccinated and boosted and when in the classroom will deliver lectures in a N95 mask.

Students with Disabilities: If you have (or think you may have) a disability, and need accommodation, contact the Center for Accommodations and Support Services (CASS) at (915) 747-5148 (voice or TTY), visit their office in Union East Room 106, or by E-Mail at cass@utep.edu. CASS is the office at UTEP that is designated to determine eligibility for accommodations and services to students with disabilities, and will arrange for any necessary accommodations.

Academic (dis)honesty and other issues: Academic dishonesty is prohibited and considered a violation of the UTEP Handbook of Operating Procedures. It includes but is not limited to cheating, plagiarism, and collusion. In this class, since it is a course for advanced scientific students, you are expected to complete your own work, but working together with your classmates and others (collaboration) is encouraged though not required.



TENTATIVE Course Outline

NOTE: This schedule is very fluid, just like the atmosphere, and likely will change based on the needs, requirements and opportunities of the students, professor, availability of guest lecturers, and the actual atmospheric conditions and phenomena which may be observable on any given day.

Reading of various chapters from the book (or portions thereof) is required for each part of class below. Please try to do the readings in advance of the lecture. The lectures are considered an adjunct/illustration of the readings and will not always match what is in the text. Problems from the textbook will be assigned as homework. Other homework assignments and readings including scientific journal articles will also be given.

Date	Read Chapter	Topic
WEEK 1	1	Introduction: Overview of Atmospheric Science/
WEEK 2		Fundamental Principles of The Atmosphere
WEEK 3	4.1-4.4, 4.6	Atmospheric Radiation
WEEK 4	2	The Atmosphere In The Earth System
WEEK 5	10	Climate and Climate Change
WEEK 6		Test 1
WEEK 7	5, 6.8	Atmospheric Chemistry
WEEK 8	1.3.6, 3.1-3.3, 6.1-6.6	H ₂ O in the Atmosphere: Moisture and Thermodynamics
WEEK 9	3.4- 3.6	Precipitation and Air Parcels- Stability
WEEK 10	7.1- 7.3	Atmospheric Forces and Dynamics
		Test 2
WEEK 11	9	Boundary Layers and Turbulence: Small Scale Circulation
WEEK 12	1.3.5, 7.4- 7.5	Large Scale and Planetary Atmospheric Circulation
WEEK 13	8.1- 8.4	Weather Systems
WEEK 14		
WEEK 15		Student Final Presentations
Thursday, December 8 th	4:00 pm (SCHEDULED)	Final Exam (Test 3)- Not comprehensive