

Atmospheric Physics I

PHYS 621, Fall 2024

Dates and Location: Wednesday & Friday, 1:00PM- 2:15PM; Sherman Hall 007
INSTRUCTOR: Dr. Belay Demoz
Email: bdemoz@umbc.edu
Ph.: 410-455-2715 (office)
OFFICE HOURS: Anytime Through Email appointment

Course Description: Composition and structure of the Earth's atmosphere, application of thermodynamics to atmospheric problems, development of the fundamental equations of fluid motion, applications to synoptic scale atmospheric circulations, boundary layer effects and other selected topics.

Recommended books (the 1st in the list is “standard”):

1. Wallace, J.M. and P. V. Hobbs, Atmospheric Science: An Introductory Survey, Second Edition, Elsevier, 2006.
2. Holton, James R., An Introduction to Dynamics Meteorology, Fifth Edition, Academic Press. Elsevier 2013.
3. Murry L. Salby, Fundamentals of Atmospheric Physics, Academic Press, 1996.

Additional references

4. David G. Andrews, An Introduction to Atmospheric Physics, Second Edition, Cambridge University, 2010.
5. North, G., and Erukhimova, T., Atmospheric Thermodynamics: Elementary Physics and Chemistry. Cambridge: Cambridge University Press, 2009.
6. Grant W. Petty: A First Course in Atmospheric Thermodynamics Sundog Publishing, 2008
7. Roland Stull: Practical Meteorology: https://www.eoas.ubc.ca/books/Practical_Meteorology/
8. Handouts and reference materials as needed

COURSE OUTLINE:

Overview

- a. Earth's atmosphere
- b. Atmospheric Radiation
- c. Overview of atmospheric motion and the general circulation

Atmospheric thermodynamics

- d. Thermodynamic Principles;
- e. Thermodynamics of moist air
- f. Static stability
- g. Thermodynamic aspects of various weather and climate phenomena:

Atmospheric Dynamics

- h. Kinematic and mathematical fundamentals
- i. Atmospheric forces
- j. Atmospheric equations of motion
- k. Applications of the equations of motion: balanced flow
- l. Applications of the equations of motion: time dependent

GRADING:

- Homework (15%)
 - Participation & Project Discussion (15%)
 - Two Midterms (25% each)
 - Final (20%)
- A: 90% and above; B: 80%-89% C: 70%-79%; D: 60%-69%; F: below 60%.

Course Strategy:

There will be no exam make-up except for University-policy accepted absence.

To promote active learning, students are strongly encouraged to read the corresponding textbook chapters before each lecture. Pre-lecture homework and discussion assignments are given routinely before lectures. Reading the sections of the textbook corresponding to the assigned homework exercises is considered part of the homework assignment; you are responsible for material in the assigned reading *whether it is discussed in the lecture or not*. No late homework submission is accepted.

Academic Honesty Policy

By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC's scholarly community, in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty, and they are wrong. Academic misconduct could result in disciplinary action that may include, but is not limited to, suspension or dismissal. To read the full UMBC Student Academic Conduct Policy, consult the UMBC Student Handbook, the Faculty Handbook, or the UMBC Policies section of the UMBC Directory. [Statement adopted by UMBC's Undergraduate Council and Provost's Office.]

Disclosures of Sexual Misconduct and Child Abuse or Neglect

As an instructor, I am considered a Responsible Employee, per UMBC's Policy on Prohibited Sexual Misconduct, Interpersonal Violence, and Other Related Misconduct (located at <http://humanrelations.umbc.edu/sexual-misconduct/umbc-resource-page-for-sexual-misconduct-and-other-related-misconduct/>). While my goal is for you to be able to share information related to your life experiences through discussion and written work, I want to be transparent that as a Responsible Employee I am required to report disclosures of sexual assault, domestic violence, relationship violence, stalking, and/or gender-based harassment to the University's Title IX Coordinator.

As an instructor, I also have a mandatory obligation to report disclosures of or suspected instances of child abuse or neglect

(www.usmh.usmd.edu/regents/bylaws/SectionVI/VI150.pdf).

The purpose of these reporting requirements is for the University to inform you of options, supports and resources; you will not be forced to file a report with the police. Further, you are able to receive supports and resources, even if you choose to not want any action taken. Please note that in certain situations, based on the nature of the disclosure, the University may need to take action.

If you need to speak with someone in confidence, who does not have an obligation to report to the Title IX Coordinator, UMBC has several Confidential Resources available to support you:

- The Counseling Center: 410-455-2472
- University Health Services: 410-455-2542
- Pastoral Counseling via Interfaith Center: 410-455-3657; interfaith@umbc.edu
- Other Resources: Women's Center: 410-455-2714; womenscenter@umbc.edu.

Title IX Coordinator, 410-455-1606

Additional on and off campus supports and resources can be found at:

<http://humanrelations.umbc.edu/sexual-misconduct/gender-equitytitle-ix/>.

Religious Observances & Accommodations: UMBC Policy provides that students should not be penalized because of observances of their religious beliefs, students shall be given an opportunity, whenever feasible, to make up within a reasonable time any academic assignment that is missed due to individual participation in religious observances. It is the responsibility of the student to inform the instructor of any intended absences for religious observances in advance, and as early as possible. For questions or guidance or to request an accommodation, please contact the Office of Equity and Inclusion at oei@umbc.edu.

Hate, Bias, Discrimination and Harassment: UMBC values safety, cultural and ethnic diversity, social responsibility, lifelong learning, equity, and civic engagement. Consistent with these principles, UMBC Policy prohibits discrimination and harassment in its educational programs and activities or with respect to employment terms and conditions based on race, creed, color, religion, sex, gender, pregnancy, ancestry, age, gender identity or expression, national origin, veterans status, marital status, sexual orientation, physical or mental disability, or genetic information.

Students (and faculty and staff) who experience discrimination, harassment, hate or bias or who have such matters reported to them should use the online reporting/referral form to report discrimination, hate or bias incidents; reporting may be anonymous.