

ATM 320: Atmospheric Thermodynamics Fall Semester 2022 (3 credits), Class Number 6016

Lecture: Tuesday & Thursday 9:00-10:20 in ETEC 480

<http://www.atmos.albany.edu/facstaff/torn/atm320/>

Instructor:

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Office hours: Monday 10:30-11:30, Wednesday 1:00-2:00, and by appointment

Teaching Assistant:

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Office hours: Tuesday and Thursday 2:00-4:00, and by appointment

Course Objective:

The goal of this course is to understand the physical laws that govern how energy and heat are transmitted in the atmosphere.

Prerequisites:

ATM 211

Text:

Atmospheric Science: An Introductory Survey, 2nd ed. by J. M. Wallace and P. V. Hobbs (W&H)

Supplementary reading:

A First Course in Atmospheric Thermodynamics by G. W. Petty (P)

Course Requirements:

6 Homework assignments: 25%

In-class quizzes: 10%

2 In-class exams: 17.5% each

Final exam (Tuesday December 13, 8:00-10:00 am): 30%

Grading: A-E

Late Homework and off-time exams are only allowed for University-recognized reasons (https://www.albany.edu/health_center/medicalexexcuse.shtml). Homework assignments lose 25% of their value per day it is late (i.e., an assignment turned in two days late cannot get better than a 50%).

Quiz Policy:

Most lectures will begin with a 2 question quiz that covers information from the previous lecture. At the end of the semester, the quiz average will be computed, excluding the lowest three scores. Missed quizzes will count as a zero; however, missing quiz scores can be included in the three dropped quizzes at the end of the semester. More than three missing quizzes will count against the student's final quiz score, unless the student has a university-recognized reason for missing classes on specific dates (see https://www.albany.edu/health_center/medicaexcuse.shtml). There are no make-up quizzes.

Course Format:

Students are expected to attend each lecture. In addition, lectures will be recorded when possible and posted to Blackboard, so students can review lectures afterward. **Watching lectures online is not a substitute for attending lecture.** Absences are unavoidable; therefore, in those situations, students are expected to view the lecture recording (Blackboard keeps track of who views each lecture).

Course Communication:

The primary communication method for the course will be through messages through Blackboard. These messages will be archived on the course page and will automatically send to your UAlbany email address. All lecture materials and assignments will be placed on both the course web page and the course Blackboard page. Students may communicate with each other through the Blackboard message system. I will answer all emails within 24 h of receipt, except on weekends.

Accommodating Disabilities Policy:

Reasonable accommodations will be provided for students with documented physical, sensory, systemic, cognitive, learning and/or psychiatric disabilities. If you believe you have a disability/disabilities requiring accommodation in this class, please notify Disability Access and Inclusion Student Services (CC 130, 442-5501, daiss@albany.edu). Upon verification and after the registration process is complete, the DAISS will provide you with a letter that informs the course instructor that you are a student with a disability registered with the DAISS and list the recommended reasonable accommodations.

Religious Observance:

Students must notify the instructor of any lectures and assignment due dates that conflict with recognized religious observances (<https://www.albany.edu/registrar/academic-calendar/religious-observances>) well in advance. The instructor will work with the student to provide an alternative arrangement.

Academic Integrity:

Although students can work together, all homework assignments must be completed independently. Homework assignments that are substantially similar to other students will be given a zero for that assignment. Copying from other students on quizzes and exams may result in a zero for that work and referral for disciplinary action under the University's policy on academic integrity (https://www.albany.edu/undergraduate_bulletin/regulations.html). Every student has the responsibility to become familiar with the standards of academic integrity at the University.

Claims of ignorance, unintentional error, or personal or academic pressures cannot be excuses for violation of academic integrity.

Course Outline:

1. Basic Definitions and Laws (3 weeks)

- definitions and quantities that describe gases (W&H 1.3, P1)
- laws and equations of state (W&H 3.1, P3)
- moisture-related definitions

2. Dry Thermodynamics (4 Weeks)

- work and the First law of thermodynamics (W&H 3.3, P5.1, 5.2)
- application to air parcels (W&H 3.4.1)
- adiabatic processes (W&H 3.4, P5.4)
- buoyancy, static stability (W&H 3.6.1)
- entropy and the Second law of thermodynamics (W&H 3.3, 3.7, P5.7, 6)

3. Moist Thermodynamics (8 Weeks)

- phase changes of water and latent heat (W&H 3.5.1-3.5.2, P7.1-7.2)
- Clausius-Clapeyron equation (W&H 3.7.3, P7.3)
- dew point temperature (P7.1)
- Bergeron-Findeisen process
- pseudo-adiabatic processes (W&H 3.5.3-3.5.4, P7.7)
- equivalent potential temperature (W&H 3.5.5, P7.8)
- skew-T diagrams and definitions (W&H 3.6, P7.6,7.9)