

H. N. Shirer  
Office Hours: MWF 11:00 AM-12:00 PM & by Appt

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### Course syllabus

ANGEL homepage for course: <http://cms.psu.edu>. This page is best viewed using Internet Explorer.

*Topics will be selected from the following; pages are from the text by Salby.*

#### 1. Perspective

- a. Atmospheric composition and structure  
(Readings: pp. 1-41)
- b. Solar-terrestrial relationships  
(Readings: pp. 41-53)
- c. Weather systems and clouds

#### 2. Equations of motion

- a. Kinematics  
(Readings: pp. 321-330)
- b. The fundamental equations  
(Readings: pp. 330-352)
- c. Hydrostatic balance  
(Readings: pp. 143-151)

#### 3. Atmospheric thermodynamics

- a. The first law  
(Readings: pp. 63-68)
- b. Adiabatic and diabatic processes  
(Readings: pp. 68-76)
- c. Entropy and potential temperature  
(Readings: pp. 79-96)

#### 4. Moisture in the atmosphere

- a. Phase transformations  
(Readings: pp. 107-126)
- b. Hydrostatic stability  
(Readings: pp.126-138, 151-194; Skew-T/Log p manual)

#### 5. Approximations

- a. Thermodynamic coordinates  
(Readings: pp. 357-370)
- b. Scale analysis  
(Readings: pp. 352-357)
- c. Geostrophic, thermal and gradient winds  
(Readings: pp. 371-387)
- d. Boundary layer phenomena  
(Readings: pp. 405-423)

## Policies

**Total score curved.** Students with an average of 90 and above will get at least an A-, 80 and above will get at least a B-, and 70 and above will get at least a C.

**Problem sets, 15% of the grade.** Students are encouraged to work together, *but must write up their answers separately*; that is the best way to be sure that the material has been grasped. The problem sets are intentionally challenging. Thus, students should start trying to do the problems soon after they are handed out so they may identify issues to discuss in class prior to the due date. Problem sets will be accepted through 5:00 PM on the due date. There may be a 20% penalty for late problem sets; students having difficulty meeting the due date should talk to me as soon as possible. No problem sets will be accepted after they have been returned and discussed.

**Two exams, on October 10, 2005 and November 21, 2005, each 25% of the grade;** these exams will be given evenings from 6:00 to 9:00 PM in 105 Walker. Note that the exams will be based heavily on the problem sets. A review session will be held during the class meeting on the day of the exam. *Make-up exams will be given by prior arrangement only.*

**Comprehensive final, most likely in 105 Walker, at a time TBD, 35% of the grade.** The date will be announced via elion (<https://elion.oas.psu.edu/>). A review will be scheduled at a time to be determined later.

**Textbook: *Fundamentals of Atmospheric Physics*, by Murry L. Salby (1996) and the Air Force *Skew-T/Log p Manual*;** this manual is available from The Student Bookstore, 330 E. College Avenue. The above readings are mostly from Salby. The recommended books on reserve in the EMS library are listed on the next page.

**Class discussion and pace.** Questions about and discussion of the lecture material or problem sets is essential for the learning process. With a small class, we can keep the atmosphere informal. The range of material is quite broad, and so the depth of any one subject is shallow. The goal of the course is to provide an overview of many aspects of the discipline, with an emphasis on background material supporting the graduate core courses.

**Notes.** There will be no class on October 14, 2005 (Penn State's Fall Study day). I will be out of town from October 15-23, 2005. The three classes that I will miss will be made up at times that are convenient for all of us.

**Academic Integrity.** This course adopts the academic integrity policy of the EMS College, which is described at <http://www.ems.psu.edu/students/integrity/statement.html>. Briefly, students are expected to do their own problem sets and to work the exams on their own. Class members may work on the problem sets in groups, but then each student must write up his or her answers separately. Students may not copy problem or exam answers from another person's paper and present them as their own. Students who present other people's work as their own, as well as the students providing the answers, will receive at least a 0 on the assignment and may well receive an F in the course.

**Recommended books**

The following books are on two-hour reserve in the Earth and Mineral Sciences Library in Deike Building.

<b>CALL NUMBER</b>	<b>AUTHOR(S)</b>	<b>TITLE</b>
QC880.4.T5B63 1998	Bohren and Albrecht	Atmospheric Thermodynamics
QC880.D84 1986	Dutton	The Ceaseless Wind (Dover Ed.)
XX(2827077.1)	Holton	An Introduction to Dynamic Meteorology (4th Ed.)
QC880.4.T5I74 1981	Iribarne and Godson	Atmospheric Thermodynamics (2 <sup>nd</sup> Ed.)
QC912.3.L57 1992	Liou	Radiation and Cloud Processes in the Atmosphere, Theory, Observation, and Modeling
QC981.3.M43 1992	McIlveen	Fundamentals of Weather and Climate
QC981.P434 1992	Peixoto and Oort	Physics of Climate
QC921.5.R63 1988	Rogers and Yau	A Short Course in Cloud Physics (3 <sup>rd</sup> Ed.)
QC879.6.S45 1998	Seinfeld and Pandis	Atmospheric Chemistry and Physics: From Air Pollution to Climate Change
QC861.2.W34 1977	Wallace and Hobbs	Atmospheric Science, An Introductory Survey