

ATM 410: Dynamic Meteorology I

Fall Semester 2011 (3 credits), Class Number 1284

Lecture: Tuesday & Thursday 8:45-10:05 in ES 232

<http://www.atmos.albany.edu/daes/atmclasses/atm410>

Instructor:

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Office hours: Tuesday and Thursday 11:45-12:45, and by appointment

Course Objective:

This course serves as an introduction to the fundamental equations that describe atmospheric motions. In addition, students will learn how to simplify the full equations to understand various physical processes. The ideas learned in this course are used extensively in future classes.

Prerequisites:

ATM 315, 320, 321

Text:

An Introduction to Dynamic Meteorology by J. R. Holton

Supplementary reading:

Mid-Latitude Atmospheric Dynamics: A First Course, by J. E. Martin

Synoptic-Dynamic Meteorology in Midlatitudes, by H. B. Bluestein

Course Requirements:

7 Homework assignments and Summary: 30%

2 In-class exams (Tentatively: 4 Oct., 8 Nov.): 20% each

Final exam (Friday 9 December 3:30-5:30): 30%

Grading: A-E

Each student will be assigned a group that will be responsible for giving a summary of the previous lecture on a regular basis. At the end of the course, each group is assigned a grade based on the quality of the summary, with adjustments based on peer assessment.

Late Homework and off-time exams are only allowed for University-recognized reasons.

Course Outline:

1. types of forces (Holton 1, Martin 2.1-2.2)
2. vertical coordinates (Holton 1.6, Martin 3.1)
3. Lagrangian vs. Eulerian derivatives (Holton 2.1, Martin 1.2)
4. momentum equations and scale analysis (Holton 2.2-2.4, Martin 3.2)
5. mass conservation and thermodynamic equations (Holton 2.5-2.6, Martin 3.2-3.3)
6. numerical weather prediction (class notes)
7. natural coordinate system (Holton 3.1, Martin 4.4)
8. balanced motions (Holton 3.2, Martin 4.4)
9. thermal wind balance (Holton 3.4, Martin 4.3)
10. vertical motion (Holton 3.5)
11. circulation and vorticity (Holton 4.1-4.2, Martin 5.1)
12. vorticity equation (Holton 4.4, Martin 5.2)
13. potential vorticity (Holton 4.6, Martin 5.2)
14. planetary boundary layer equations (Holton 5.2-5.3)

Advice:

- Each lecture uses information discussed in the previous one; therefore, it is very important to study your notes after every lecture. Do not wait to study until the night before an exam.
- If you do not understand the material from lecture, either ask questions in class, or come to office hours. The longer you wait to ask for help, the harder it will be to “catch up”.
- Start homework assignments early and try the problems on your own before you work with others. While it may seem tempting to work together, previous students who worked in groups fared worse on exams than those who worked individually.