

**METEO 422**  
**DYNAMIC METEOROLOGY II**  
**Fall 2006**

John Clark  
513 Walker  
Office Hours: M,W 3:30-5:00  
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The TA for this course is Chang Hyun Yoo(e-mail: [jws295@psu.edu](mailto:jws295@psu.edu)). He is a graduate student in meteorology. His office is 413 Walker.

### **OBJECTIVES**

- 1. develop skills in scientific problem solving**
2. understand the principles governing atmospheric motion and to gain the ability to apply them to a variety of atmospheric systems,
3. understand the implications of hydrostatic and geostrophic balance on the structures and evolution of synoptic-scale systems,
4. understand the role of atmospheric motions in the global heat and momentum budgets.

### **OUTLINE**

#### **I. METEO 421 REVIEW**

- a. hydrostatic balance
- b. geostrophic balance & thermal wind
- c. vorticity and circulation

#### **II. BACK TO THE BASICS**

- a. dimensional analysis
- b. kinematics of pressure and temperature
- c. introduction to energetics

#### **III. ATMOSPHERIC WAVES**

- a. perturbation technique
- b. phase and group velocities
- c. internal gravity waves
- d. Rossby waves

#### **IV. INSTABILITIES**

- a. parcel versus wave approach
- b. convective instabilities
- c. barotropic instability
- d. inertial and symmetric instability
- e. baroclinic instability

#### **V. SYNOPTIC-SCALE SYSTEMS**

- a. storm structure
- b. quasi-geostrophic theory
- c. baroclinic structures
- d. omega equation and Q vectors
- e. fronts

#### **VI. GENERAL CIRCULATION**

- a. energetics
- b. momentum budget
- c. zonally-symmetric circulations
- d. longitudinally-dependent features

**TEXT:** Holton, J.R. An Introduction to Dynamic Meteorology, Academic Press

**NOTES:** Most class lectures will be aided with computerized notes and demonstrations. If you wish, you can purchase a set of images from the computerized notes from Kinko's Copy Center, 101 N. Atherton. I will occasionally have handouts and later on a set of notes will be made available on ANGEL.

## **EXAMINATIONS**

Two quizzes and a final will be given. The dates are:

quiz # 1 October 3

quiz # 2 November 14

final Time to be announced later

The final tally will be assigned according to the following rule:

Quiz # 1 20%

Quiz # 2 20%

Final 40%

Homework 20%

## **GRADES**

A 85-100

B 72-85

C 60-72

D 50-60

F <50

Some students will be close to transitions between grades. They will have the chance to move up a grade **provided** he or she has participated in classroom discussions, has attempted to answer questions posed in class and has handed in all the homework assignments.

## **ACADEMIC HONESTY**

Dishonesty includes cheating on an exam and misrepresenting the work of others as your own. It may result in failure of the course. For complete information about the University's policy on Academic Honesty, consult the Policies and Rules section of the Student Guide to the University, 2000/2001.