

# **GEOL-G 490 Atmospheric Fluid Dynamics**

## **Spring 2015 – Indiana University**

### **Administrivia**

Meetings: T & R, 1–2:15 p.m., Geology 221, unless otherwise arranged

Instructors: Dr. Cody Kirkpatrick (codykirk) and Dr. Paul Staten (pwstaten)  
CK keeps regular office hours 10–12 on Thursday in IMU. Appointments whenever available. Just email. Both of us have offices in MSB, if that's more convenient.

### **Objective of the Course**

Students are treated to a calculus- and vector-based coverage of the theory of atmospheric flows. Topics include: the equations of motion in inertial and rotating reference frames; isobaric, natural, and spherical coordinates; geostrophic, cyclostrophic, and gradient wind balances; and the kinematics and dynamics of circulation and vorticity.

At the end of the course, students should be able to:

- utilize the natural coordinate system to interpret basic atmospheric flow patterns
- derive and apply the thermal wind relationship to maps of geostrophic wind
- describe mathematically and interpret the physical relevance of geostrophic, cyclostrophic, gradient, and inertial flows
- calculate circulation and vorticity given information about the velocity field
- interpret and scale the terms in the 3-D equation of motion, mass conservation, and vertical vorticity equations

### **What needs to be completed for the course for a grade to be assigned?**

The student's course grade will be assigned based on the weights of these assessment groups:

- Homework sets: 35%
- Two in-class, hour exams: 20% each (40% total)
- Final exam: 25% (Thursday, May 7, 2:45 – 4:45)

*Special note for graduate students enrolled in GEOG-G830:* To ensure rigor at the graduate level, homework sets and exams will be different in scope and design than those given to undergraduates enrolled in the companion course section.