

**METR 5113, Advanced Atmospheric Dynamics I**  
**Fall 2012**  
**MWF 1:00 – 1:50 PM**  
**National Weather Center (NWC), Room 5930**

**Instructor**

Prof. Alan Shapiro  
office: National Weather Center, room 5423  
phone: 325-6097  
email: ashapiro@ou.edu (email is the best way to reach me – I read it many times a day)

**Office hours**

MWF, 2 – 3 pm  
Additional office hours upon request – just ask! You can also drop by my office anytime and see if I'm free. I'm usually not here early in the morning (er, morning).

**Required text**

Kundu, P. K. and Cohen, I. M., 2003: Fluid Mechanics. Academic Press

**Recommended texts**

A list of references and suggested readings will be distributed on the first day of class.

**Class notes**

Class notes will be posted online at: <http://weather.ou.edu/~ashapiro/METR5113>

**Prerequisites**

Math 4163 (Partial Differential Equations) or equivalent coursework

**Grading**

Two in-class exams (30% each)  
Final exam (40%)

**List of topics (tentative)**

Vector and Cartesian tensor analysis. Lagrangian and Eulerian viewpoints. Streamlines and Trajectories. Forces. Mass conservation. Useful flow decompositions. Potential theory and applications. Bernoulli's equation and applications. Navier-Stokes equations and some exact solutions. Kinematics of vorticity and circulation. Vorticity dynamics. Geostrophic flow. Thermal wind. Ekman layer. Rossby waves. Linear gravity waves. Shallow water and deep water limits. Dispersion. Group velocity. Internal gravity waves.

*The University of Oklahoma is committed to providing reasonable accommodation for all students with disabilities. Students with disabilities must be registered with the Disability Resource Center prior to receiving accommodations in this course. The Disability Resource Center is located in Goddard Health Center, Suite 166, phone # 325-3852.*