

**METR 5113 Advanced Atmospheric Dynamics I**  
**Fall 2014**  
**National Weather Center (NWC), Room 5930**

**Instructor:**

Alan Shapiro  
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**Office hours:**

MWF: 2 - 3pm  
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:**

2 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. Group velocity. Internal gravity waves.

*The University of Oklahoma is committed to providing reasonable accommodation for all students with disabilities. Students with disabilities who require accommodations in this course should contact me as early in the semester as possible. Students with disabilities must be registered with the Disability Resource Center prior to receiving accommodations in this course.*