ATM/PH 5680  
Atmospheric Fluid Dynamics  
Fisher 132  
MWF 9:05-9:55 AM  
Fall Semester 2011

Instructor:  
Raymond Shaw (rashaw@mtu.edu)

Office Hours:  
By appointment or by email.

Text:  
The required text is Fluid Mechanics, Fourth Edition, by Pijush Kundu and Ira Cohen. Other references you might be interested in looking at are Physical Fluid Dynamics, by D. J. Tritton, Atmosphere-Ocean Dynamics, by A. E. Gill, and Introduction to Geophysical Fluid Dynamics, by B. Cushman-Roisin.

Course Outline:  
The course will be divided into two parts:  
1. Fundamentals of fluid mechanics (topics from chapters 1, 2, 3, 4, 5, 8; emphasis on chapters 3, 4, 5)  
2. Atmospheric applications (topics from chapters 7, 10, 12, 13, 14; emphasis on chapters 7, 12, 14)  
Only limited prior exposure to fluid mechanics will be assumed (e.g., Bernoulli’s equation, hydrostatics, continuity), but you should have a good background in classical mechanics and experience with ordinary and partial differential equations.

Chapter 1: Introduction  
Chapter 2: Cartesian Tensors  
Chapter 3: Kinematics  
Chapter 4: Conservation Laws  
Chapter 5: Vorticity Dynamics  
Chapter 7: Gravity Waves  
Chapter 8: Dynamic Similarity  
Chapter 10: Boundary Layers and Related Topics  
Chapter 12: Instability  
Chapter 13: Turbulence  
Chapter 14: Geophysical Fluid Dynamics

Grading:  
60% Homework/Quizzes  
20% Project  
20% Final Exam

Participation:  
The size of this class allows us to be informal in our interactions, so all students will be expected to participate actively in discussions. It is of utmost importance, therefore, that you will have read the material and formulated questions and ideas for discussion prior to each class.

Homework:  
Homework will be assigned weekly, and will either be graded or covered in a short quiz. Please turn in your homework at the beginning of class on the due date. Also, you should have access to software that can be used for plotting functions and performing basic numerical methods (e.g., Fortran, MATLAB, Mathematica, or MathCAD).

Final Exam:  
Wednesday December 14, 8:00-10:00 AM
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