

Earth System Science 229: Geophys Fluid Dynamics II (Winter 2009)
(<http://www.ess.uci.edu/~yu/ess229.html>)

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Tuesdays & Thursdays 11:00-12:20, CH1103

COURSE DESCRIPTION

This course introduces the student to atmospheric and oceanic fluid dynamics. Equations of motion for a rotating stratified fluid. Scaling analysis, potential vorticity dynamics, linear waves, energetics and instability theory with applications to the mean circulation and variability.

TEXTBOOKS

Marshall and Plumb: Atmosphere, Ocean and Climate Dynamics: An introductory text, Academic Press.
J.R. Holton: An introduction to Dynamic Meteorology, Academic Press.

GRADES

Homework (40%); midterm (60%)

HOMEWORKS

Issue and due every Thursday

SYLLABUS

Week 1	1/5 & 1/7	Introduction and Review of Mathematical Tools Review of useful mathematical tools Estimating with scale analysis Fundamental and apparent forces
Week 2	1/12 & 1/14	Basic Conservation Laws Conservation of momentum: The equations of motion Conservation of energy: The thermodynamic energy equation The continuity equation Primitive equations
Week 3	1/21 & 1/22	Applications of the Equations of Motion Vertical coordinates: pressure and potential temperature Balanced (geostrophic, inertial, cyclostrophic, gradient) flows Thermal wind balance trajectories and streamlines
Week 4	1/26 & 1/28	Circulation, Vorticity, and Divergence The Circulation theorem Vorticity and potential vorticity The relationship between vorticity and divergence Velocity potential and stream function
Week 5	2/2 & 2/4	Baroclinic Instabilities Angular momentum budget Available potential energy Energetics of baroclinic waves
Midterm	2/12 (Friday)	