# AOS 571: Introduction to Geophysical Fluid Dynamics
## Fall 1999

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**1. Transport and mixing**

- tracers, trajectories, Eulerian and Lagrangian frames, mass conservation (SG)
- rotating spherical coordinates, geoid, Coriolis force, angular momentum (SG)

**2. Conservation of momentum, heat and energy**

- equations of state, entropy, potential temperature, gravitational stability (PK)
- energy conservation (PK)

**3. Scaling principles and filtered models**

- speed of sound, acoustic waves (PK)
- Boussinesq approximation, anelastic approximation (PK)
- hydrostatic approximation, shallow-water model (PK)
- vertical coordinates (PK)

**4. Circulation and vorticity**

- 2-D flows, divergence, deformation, vorticity (SG)
- vorticity equation, vortex tubes, solenoids (SG)
- potential vorticity (SG)

**5. Relation between flow and mass fields**

- scale analysis, geostrophy, Sverdrup balance (SG)
- baroclinicity, thermal wind, Ekman layer (SG)
- inertial instability, geostrophic adjustment, radius of deformation (SG)
- quasi-geostrophic models (SG)

**6. Barotropic dynamics**

- Rossby waves, bottom slope, beta effect (SG)
- barotropic vorticity equation (PK)
- coastal and equatorial waves (AOS 572)
- dispersion, reflection of Rossby waves (AOS 572)
- edge waves, barotropic instability, stability theorems (PK)

**7. Baroclinic dynamics**

- available potential energy, energy diagram (PK)
- 2-layer model, baroclinic instability (PK)