

# A&OS C115/C228 - Mesoscale Dynamics

Spring 2009

**Instructor:** Prof. Robert Fovell

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**Office hours:** Whenever my door is open

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**Credit:** 4 hours.

**Prerequisites:** A&OS 101 (for C115 only).

**Class meetings:** Tu Th 11-2:15 (7121 Math Sciences).

**Required text:** None

**Suggested text:** R. A. Houze, Jr., *Cloud Dynamics*.

**Overview:** This course reviews topics in mesoscale and convective-scale meteorology.

**Grading:** Experiments (30%), Final exam (30%), Final project (30%), Class participation (10%). Final is scheduled for Monday, June 8, 11:30-2:30, but **may** be held on last day of class; more information later. **Keep copies of all submitted materials.**

**Online materials:** <http://www.atmos.ucla.edu/~fovell/AOSC115>

**Course outline (subject to change) - text references are sections in Houze's book:**

- Review of dynamics. The anelastic approximation and pressure decomposition. Experiment: DTDM, thermal. Text: 2.1, 2.3, 2.6, 7.1, 7.2.
- The sea-breeze circulation. Experiment: DTDM, surface\_flux and rotunno\_seabreeze. Text: none.
- Thermal and shear instabilities. Horizontal convective rolls. Kelvin-Helmholtz waves. Experiment: ARPS, effect of wind and shear on rolls; DTDM, cooling\_zone. Text: 2.9, 5.2, 8.9.
- Ordinary cell thunderstorms. Squall line, RKW theory, cold pool propagation, downbursts. Experiments DTDM, cooling\_zone. Text: 8.1, 8.2, 8.9, 8.10, 8.11, 9.1, 9.2.
- Supercell thunderstorms. Rotation, storm-splitting, deviant motion, tornadogenesis. Experiment: ARPS, Del City storm. Text: 7.4, 8.3-8.7.
- Hydraulic jumps and mountain wave clouds. Experiment: ARPS, flow over a mountain. Text: 12.2.
- Atmospheric heat sources. Experiment: DTDM, atmos\_heat\_source. Text: none.

**Caveats:**

“Everyone knows that dragons don’t exist. But while this simplistic formulation may satisfy the layman, it does not suffice for the scientific mind. The brilliant Cerebron, attacking the problem analytically, discovered three distinct kinds of dragon: the mythical, the chimerical, and the purely hypothetical. They were all, one might say, nonexistent, but each nonexisted in an entirely different way.” – Stanislaw Lem, in *Cyberiad*.

“It is a capital mistake to theorize before you have all the evidence. It biases the judgment.” – Arthur Conan Doyle’s Sherlock Holmes, in *A Study in Scarlet*.