

CONVECTIVE CLOUDS AND STORMS
METR 6223
Fall 2014

Tues., Thurs. 10-11:15 AM
(make-up classes to be scheduled when necessary)

NWC 5930

Instructor: Prof. Howard (Howie "Cb") Bluestein
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Office hours: Mon., Wed., 1:30 - 2:30 PM (tentative)
Office hours may be cancelled if there is a severe-thunderstorm outbreak (or a threat of the aforementioned).
Other times by appointment please!

Text: *Severe Convective Storms and Tornadoes: Observations and Dynamics* by H. Bluestein, Springer/Praxis, June 2013

Texts (supplemental, but not required): *Atmospheric Convection* by K. A. Emanuel, Oxford Univ. Press; *Cloud Dynamics* by R. A. Houze, Jr., Academic Press; *Synoptic-Dynamic Meteorology in Midlatitudes* (Vol. II) by H. Bluestein, Oxford Univ. Press; *Tornado Alley: Monster Storms of the Great Plains* by H. Bluestein, Oxford Univ. Press

Selected recent journal articles and Powerpoint presentations (supplemental; some to be provided on the web) at <http://weather.ou.edu/~hblue/metr6223>

Prerequisites: METR 5113 (Advanced Atmospheric Dynamics I or equivalent).

Course outline:

1. Basic dynamics
 - a. Buoyancy
 - b. Boussinesq approximation
 - c. Anelastic approximation
 - d. Vorticity equation, circulation analysis, buoyancy and dynamic pressure contributions
2. Local convection (brief overview)
 - a. Similarity theory
 - b. Plumes
 - c. Thermals
3. "Global" convection
 - a. Rayleigh convection
 - b. Rotational effects

- c. Effects of linear shear (brief overview)
- 4. Precipitating convection: Observation and theory
 - a. Ordinary cells
 - b. Supercells
 - c. Mesoscale convective systems (including squall lines and bow echoes)
- 5. Tornadoes
 - a. Observations
 - b. Dynamics

Grades: two quizzes (50% each)

There will be some problem sets designed to help you learn the material. These problem sets will be graded qualitatively and used to determine borderline grades.

Note: Any student in this course who has a disability that may prevent him/her from fully demonstrating his/her abilities should contact the instructor personally as soon as possible so the instructor can discuss accommodations necessary to ensure full participation and facilitate the student's educational opportunity.