

METEOROLOGY 5503

CLIMATE DYNAMICS

(Spring 2014)

Professor Peter J. Lamb

NWC Room 2107: 2:00-2:50 pm M, W, F (extended to 3:15 pm when needed)

This is a beginning graduate course for (in recent years) students in Meteorology, Hydrology, Geology, and Mathematics.

TOPICS

1. An Historical Perspective – From Climatology to Climate Dynamics (6 lectures)
Climate System; Time-Scale Variability; External versus Internal Forcing; Climate Transitivity; Tools and Scope of Climate Dynamics

2. General Circulation of the Atmosphere – Present Average Climate System Behavior (14 lectures)
History; Vision of Victor Starr; Global Budgets of Angular Momentum, Energy, Water Vapor; Regional Water Budget; Meridional Ocean Heat Transport

3. Introduction to Climate Modeling (8 lectures)
Theoretical Basis; Predictability; Model Hierarchy; Simple Models, Climate Sensitivity, and Global Warming Applications; Global Climate Models and Prescribed Sea Surface Temperature Experiments

4. Survey of Past Climates (7 lectures)
Chronological Description; Glaciation Frequency; Greenhouse Gas Variability; Milankovitch Forcing; Isotope Analysis

5. Example of Interannual Climate Variability – the El Niño-Southern Oscillation (9 lectures)
Teleconnection Concept; ENSO Phase and Indices: Diagnostic Tools (wind stress curl, velocity potential, outgoing LW radiation); ENSO cycles; Regional-Seasonal Prediction Applications; 2014 Tropical Pacific Monitoring

GRADING

Mid-Course Exam -- on first half of course (20%)

End-of-Course Exam -- on second half of course (20%)

Homeworks (4) -- discussions, problems, report on *Science* or *Nature* article (30%)

Literature Review or Research Paper (30%)

TEXTBOOKS (need to be purchased)

Peixoto, J. P., and A. H. Oort, 1992: *Physics of Climate*. American Institute of Physics, New York, 520 pp. (Not available at campus bookstores: Obtain through web, e.g. www.half.com)

Lamb, P. J., 2014: Course Notes for Meteorology 5503. (available from campus copy shop).

Additional reading materials will be assigned and distributed throughout the course.

Any student in this course who has a disability that may prevent him or her from fully demonstrating his or her abilities should contact the Instructor personally as soon as possible, so we can discuss accommodations necessary to ensure full participation and facilitate your education opportunities.