

Master Syllabus
Department of Geography

GEOG 451/551: Dynamic Meteorology

Course Description

Study of the variables that explain four-dimensional atmospheric behavior with a primary focus on synoptic-scale processes. Special attention is given to the governing equations and associated approximations and assumptions relevant to numerical weather prediction. (3 credit hours).

Prerequisite: GEOG 330 or 530; MATHS 165, 166; PHYCS 120, 122 or permission of the instructor.

Course Objectives

The objectives of the course are to:

- Understand the theoretical foundations of atmospheric motion using quantitative analyses
- Evaluate and discuss how the governing equations describe synoptic-level air movement
- Assess the impact of fundamental forces on atmospheric motion
- Derive mathematical equations that describe and explain large-scale movement of air

Course Rationale

This course is part of Option IV's Professional Meteorologist Track, which is designed to meet the requirements for employment by the National Weather Service (NWS) as a meteorologist (GS-1340). Dynamic Meteorology is required by both the NWS and the American Meteorological Society as part of a meteorology (or meteorology-equivalent) degree.

Course Content and Format

The course material focuses quantitative analysis of large-scale atmospheric motion. Topics covered include fundamental forces, vorticity, advection, equations of motion and conservation, geostrophic/cyclostrophic/gradient winds, vertical motion, and quasi-geostrophic analysis.

The course format is a combination of lecture and discussion. Students are actively encouraged to participate in discussions, as well as deliver presentations on relevant topics or journal articles.

Textbook Suggestions

An Introduction to Dynamic Meteorology, 4th ed. James R. Holton. Elsevier Academic Press. 2004.

Mid-Latitude Atmospheric Dynamics: A First Course. Jonathan E. Martin. Wiley. 2006.

Methods for Evaluating Student Performance:

Student performance will be evaluated via some combination of the following methods:

- Examinations
- Homework exercises (math- and physics-based)
- Participation in class discussions
- Presentations
- Quizzes

Students enrolled in GEOG 551 (graduate level) will be required to complete additional work (such as a term paper, lecture on specialized topic relevant to the course).

Evaluation of the Course

Student evaluation of the course will be accomplished using university (and departmental) course evaluation forms. Departmental evaluation may include peer or chair evaluations.