

Master Syllabus
Department of Geography

GEOG 330/530: Weather Analysis

Course Description

Presentation and practice of synoptic- and meso-scale diagnostic analysis techniques, including a review of satellite and radar remote sensing systems and image interpretation. Introduction to numerical weather prediction. (3 credit hours).

Prerequisite: GEOG 230 or instructor permission

Course Objectives

The objective of the course is to introduce students to the various methods by which meteorological and weather information is gathered, measured, and displayed, for use in weather forecasting applications. The specific aims of the course are to introduce (1) basic meteorological data collection and data coding methods, (2) the displaying of that information on surface and upper air synoptic charts, (3) the interpretation and forecasting applications of these charts, (4) the methods of gathering and displaying information from weather radar and upper air soundings and (5) the fundamentals of satellite meteorology and interpretation of satellite-based weather images, (6) the basics of numerical modeling and model output interpretation, and (7) the essentials of isobaric analysis, frontal analysis and plotting and analysis of thermodynamic diagrams.

Course Rationale

Students will become familiar with methods of obtaining information, data, and weather forecasts using the internet, and learn how to perform basic meteorological analyses using a variety of data sources. This training will facilitate weather map and web usage in more advanced synoptic meteorology courses (e.g., Geography 449) and serve as a background of applied information for more theoretical meteorology classes. Geography 330 serves as a requirement for the Option IV: Meteorology and Climatology, Professional Track; Geography 530 partially fulfills the elective requirement. In addition, weather analysis is one of the required courses for those seeking qualification for the title "meteorologist" by the American Meteorological Society (AMS) and for employment by the National Weather Service under the Federal Civil Service guidelines (GS-1340).

Course Content and Format

Students will be presented material in a lecture style format that will include multimedia presentations and case study discussions. The following shows an example of a potential outline of topics for this course, with time allotment for each topic at the discretion of the instructor:

Textbook Suggestions

Vasquez, T., 2008: *Weather Map Handbook*. Austin, TX: Weather Graphics Technologies, pp. 164.

Watts, A., 1999: *The Weather Handbook*. Dobbs Ferry, NJ: Sheridan House, Inc., pp. 160

Methods for Evaluating Student Performance

Forms of evaluation might include examinations, quizzes, homework problem sets, presentations, weather forecast contest participation, and a final project (e.g., weather journal). Graduate students enrolled in the course as Geography 530 would be expected to accomplish an additional work load (e.g., term paper, additional problems on homework and exams, etc.).

- I. Introduction
 - A. Geography: coordinate systems and spatial relationships
 - B. Weather variables and measurement

- II. National Weather Service (NWS): Beginnings to Modernization
 - A. Historical overview
 - B. Modern structure and organization
 - C. NWS technology introduction: ASOS, AWIPS and Wind Profilers

- III. Meteorological codes
 - A. Surface station model
 - B. METAR

- IV. Surface map analysis

- V. Rawinsonde network and upper air data
 - A. Upper air station model
 - B. Upper-level constant pressure charts: features and forecasting uses
 - C. Other observational charts: q-vector, thickness, vorticity

- VI. Radiosonde-based charts:
 - A. Thermodynamic diagrams
 1. Soundings
 2. Stability indices
 - B. Surface-500 mb Relative Humidity

- VII. Remote Sensing Basics: Satellite and radar imagery
 - A. Radar composite summary chart and symbols
 - B. Satellites
 - 1. History and weather based applications
 - 2. Imagery: visible, infrared, and water vapor
 - 3. Interpretation
- VIII. Human-based forecast products
 - A. SPC Convective outlook
 - B. HPC Surface prognosis
 - C. Area forecast discussion
- IX. Numerical Weather Prediction
 - A. Introduction: history, ensemble predictions, and obtaining data
 - B. NWP models: Interpretation and limitations

Evaluation of the Course

Student evaluation of the course using university (and departmental) course evaluation forms.