Synoptic Meteorology
Meteorology 411/511
Fall 2012

Class meetings (all in 3128):
Lecture: W 11:00-11:50 pm Labs: MWF 4:00-4:30; R 9:00-11:50 am

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Web Site for additional course support: http://www.meteor.iastate.edu/classes/mt411
Portfolio Web Site for Forecasting Contest and messages:
http://www.meteor.iastate.edu/forecast/

Course Objectives In this course, the general characteristics of mid-latitude synoptic weather systems will be explained and compared with the quasi-geostrophic theory of baroclinic development. A thorough understanding of synoptic- scale processes will be emphasized in daily weather briefings given by all students. Students should leave the course able to offer a "reasonable" explanation for any larger-scale weather event that might occur.

Texts: "Synoptic Meteorology" Course Notes (required).

You may also find your "Weather Forecasting Handbook" from 311, and the new synoptic textbook, "Midlatitude Synoptic Meteorology" by Gary Lackmann helpful.

Other handouts will be distributed when appropriate.

Tentative Syllabus

A. INTRODUCTION TO WEATHER FORECASTING

August 22-23: Norwegian cyclone model and related forecasting principles; IN CLASS LAB: Review of weather data sources [A1-B9]. (CONTEST begins Aug. 22)
August 29-30: Hurricanes [1-8; Chap 23 of Svr/Hazard]; IN CLASS LAB

B. FUNDAMENTALS OF SYNOPTIC-DYNAMIC METEOROLOGY (Chaps. 6-7 Svr/Hazard Wx Book)

September 5-6: Kinematics of the wind field: Divergence, Vorticity, and Deformation [9-20].
September 12-13: Balanced flow – geostrophic and gradient wind [21-31].
September 20: Thermal wind, Thickness [32-41]. (Instructor gone 9/17-19)

C. QUASI-GEOSTROPHIC THEORY

Sept. 26-27: Quasi-geostrophic theory; QG Height Tendency Equation [42-64]; IN CLASS LAB.
October 3-4: Quasi-geostrophic Omega Equation [42-64]; IN CLASS LAB.
October 10: REVIEW
October 11: MIDTERM - (material through Oct. 4)
October 17-18: Q-vectors, Quasi-geostrophic summary [65-73].

D. MISCELLANEOUS SYNOPTIC TOPICS

October 24-25: Fronts, Frontogenesis Equation [74-83; Chap 8 of Svr/Hazard].
October 31 - Nov 1: Baroclinic Development (prediction of surface pressures) [84-88; Chaps 9-10 of Svr/Hazard].
November 7-8: Isentropic Analysis [89-96]. TA will teach.
November 14-15: Organization of cloud and precipitation systems [97-99]; IN-CLASS LAB: Case study.
November 21-22: No CLASS - Happy Thanksgiving!
November 28-29: Miscellaneous topics (e.g., Observing systems, NWP, newer theoretical models) [100-108]; IN-CLASS LAB.
December 5-6: Long-range Prediction/Ensemble Techniques [109-115], REVIEW
December 10 (2:15-4:15 pm) FINAL EXAM (tentative date)

Grading for MT411/511:

40% Lab exercises (due at the beginning of next lab; late assignments receive one-half credit)
23% mid-term exam
27% final exam
411: 10% Forecast contest, weather briefings, special exercises
511: 5% Extra lab questions, special exercises, weather briefings(?)
511: 5% Case Study Project

NOTE ABOUT DISABILITIES: If you have a documented disability and anticipate needing accommodations in this course, please make arrangements to meet with me soon. Please request that a Student Disability Resources staff send a SAAR form verifying your disability and specifying the accommodation you will need.

NOTE ABOUT ACADEMIC DISHONESTY: In this course, you may be permitted to do some of the weekly lab exercises outside of class. Although I understand it can be helpful to work with others in doing the lab exercises, I caution you to be sure to do your own work. Traditionally, many students receive far worse grades on the exams in this course than on the laboratory exercises, which usually indicates that the students relied too much on others when doing the labs. If I receive lab exercises from two or more students that are basically identical, I will regard it as cheating. All cases of such academic dishonesty will be reported to the Dean of Students. In addition, if problems persist on the lab exercises, I may have to require that they all be done in-class.

FINAL THOUGHTS: Although a key goal in this class is that you learn to understand the atmosphere deeply enough to be a good weather forecaster, I hope you also learn to appreciate the complexity and beauty of it, and the orderliness of the laws that govern it. I have been a weather fanatic from as early as I can remember growing up in Johnstown, PA (Flood City USA), and am always impressed by those aspects of the atmosphere. If you want to know more about me, go to http://www.ge-at.iastate.edu/people/faculty/william-gallus and click on "About Me".