

AOSC 470/600: Synoptic Meteorology

Fall 2014

Instructor

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<http://www.atmos.umd.edu/~dkleist/aosc600.html>

Classes: Tu/Th 9:30-10:45 a.m., CSS 3400 (AOSC Library), 3 Credits

Office Hours: M 1:30-2:30 p.m., or by appointment

Course Catalog Description:

Atmospheric properties and observations, meteorological analysis and charts, operational numerical forecasts. Application of quasigeostrophic theory, baroclinic instability, midlatitude and mesoscale weather systems. Tropical meteorology. Weather forecasting using numerical and statistical models. Prediction of weather phenomena on the global, synoptic, meso, and local scales. Analysis of surface and upper air data; Norwegian cyclone model; introduction to weather forecasting.

Prerequisites:

AOSC431 and AOSC432 (for AOSC 470)

AOSC 610 or concurrent with AOSC610 with approval (for AOSC600)

Course Objectives:

1. Apply synoptic-dynamic meteorological theory and diagnostic methods to real world situations
2. Read and interpret weather maps
3. Develop necessary skills for interpreting output from numerical weather prediction models with goal of constructing skillful weather forecasts
4. Discuss, communicate, and present weather analysis and forecasts effectively
5. Establish tools to perform own diagnoses and maps

Difference between 470 & 600

The courses are cross-listed and taught concurrently with identical course content. *However, the amount of work, exam questions, and evaluation criteria will be different.* Credit will only be granted for 470 or 600. If you are taking credit for 600, you will be treated the same as all other students taking the course for 600 credit, regardless of student status (undergraduate, professional masters, or graduate student).

Required Text

Midlatitude Synoptic Meteorology: Dynamics, Analysis, and Forecasting, by G. Lackmann, AMS Books.

Recommended Texts

Weather Map Handbook, by T. Vasquez, 2nd Edition, Weather Graphics Technologies.

Mid-latitude Atmospheric Dynamics: A First Course, by J. E. Martin, Wiley.

Other Reference Texts

An introduction to Dynamic Meteorology, by J. R. Holton and G. J. Hakim, Elsevier.

Synoptic-Dynamic Meteorology in Midlatitudes Vols. 1 & 2, by H. Bluestein, Oxford University Press.

Selected Journal Articles

Weather Challenge

Participation in the national WxChallenge forecasting competition is **mandatory** for this course. While actual forecast performance will not directly impact your grade, lack of participation will. Each missed forecast reduces your participation grade. Bonus points will be available for students that perform better than the instructor in each city (except for Caribou, ME). Students will be required to log a minimum set of information for each prepared forecast.

Adam Greeley will handle the sign-up for the challenge. Please be sure to note that you are participating via AOS600 (even if you are taking it for 470). This will make management of student participation easier. Visit the website for more information (<http://www.wxchallenge.com>). Forecasting for the first city (Wilmington, NC) begins on September 29, 2014.

I encourage students to participate for the entire year as we will be participating as a group/university. If you anticipate that you will only be participating for the fall semester, please note that upon sign-up. Cost for fall semester only is \$3.00. If you sign up for the year, the cost is \$5.00. *It is easier to add people mid-season (between semester) than to subtract. If you are unsure, only sign up for the fall semester.*

Map Discussions

Map discussions will take place at the beginning of each class. I will take the lead early in the semester. Thereafter, students (groups of 2-3) will be assigned to take turns providing a brief review of recent weather, status of current weather, and short-term forecast discussion.

Public Weather Briefings

For those students taking AOSC 600, you will be required to take the lead in the departmental weather briefings at least once (day and time to be determined based on availability). This will be done in pairs (or group of three depending on numbers). Attendance and participation in the briefings is strongly encouraged for all students.

Homework Assignments

Various homework assignments will be handed out throughout the semester. Some of the assignments will be geared toward training on data visualization to assist in creating specific graphics for map discussions and the research project.

Exams

There will be three in-class exams. AOSC600 students will be required to answer all questions. AOSC470 students will be allowed to select a certain subset of questions to answer. There will be no final exam during finals week.

Case Study/Course Project

All students (470 and 600) will be required to perform a research project on a historical meteorological event. The case chosen for the research project should be for a high-impact, synoptic weather event of interest. The research project will require the student to collect the relevant weather maps, meteorological data, and investigate what happened and describe the impact. Some case study data is available via COMET:

<http://data.eol.ucar.edu/cometCases/avail.html>

Data for other cases can likely be retrieved via NCEP, NCDC, NCAR, or other means so long as they are recent.

Those taking the course for AOSC470 credit will be required to submit a research paper of no more than 2500 words (~8-10 pages, 12 pt font, double spaced), with accompanying diagnostics and graphics. For those taking the course for AOSC600 credit, you will be required to make a 10-minute presentation.

Details regarding the research project will be distributed early in the semester.

Attendance

This is an upper-level course. There is a lot of material to cover and things move quickly. Attendance and participation is mandatory. Make-up exams and late assignments will not be acceptable without documented, appropriate reasoning and advanced notice.

Honor Code

Academic dishonesty will not be tolerated. Students are responsible for educating themselves and following the university honor code:

<http://www.shc.umd.edu/SHC/default.aspx>

Grading

Exams (40%), Case Study/Research Project (20%), Homework (15%), Map Discussions (15%), WxChallenge and Class Participation (10%)