

ATS 540: Daily Weather Laboratory I (aka Introduction to Synoptic Meteorology)

Fall 2012

TR, 1:00-2:50 PM, ATS Room 101

Course Description and Prerequisites

This course will serve three primary purposes. The first is to provide an introduction to the structure and dynamics of the atmosphere for students without an undergraduate background in meteorology. The second is to examine the dynamic and thermodynamic characteristics of synoptic-scale weather systems. The third is to provide practical applications of meteorological principles and concepts for both research and weather forecasting.

The course is scheduled for four hours per week, which will nominally include one hour of lecture and one hour of lab each day of class, although this will vary throughout the semester.

There are no prerequisites for this course, but concurrent registration in ATS 601 (or having previously completed ATS 601) or permission of the instructor is required.

Learning Outcomes

Upon completion of this course, students will be able to:

- Understand the basic characteristics of the atmosphere and the tools used to analyze and forecast the weather
- Describe the basic theories describing synoptic-scale weather phenomena
- Apply the theories to observed weather phenomena through analysis of recent and historical weather events

Instructor Information

Name	Dr. Russ S. Schumacher
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Office hours	By appointment; please send e-mail to set up time
Office location	ATS Room 413
Course websites	http://schumacher.atmos.colostate.edu/teaching/ats540/ http://ramct.colostate.edu

Teaching assistant

Name	Vanessa Vincente
E-mail	vvincent@atmos.colostate.edu
Phone	970.491.8014
Office hours	TBD (will be determined first week of class)
Office location	ATS Room 412

Readings

Required readings: Lecture notes, which will be posted online at RamCT. These notes were originally developed by Dr. Sue van den Heever and modified by Dr. Schumacher.

Other useful texts (not required):

C.D. Ahrens, *Meteorology Today*, 9th edition or later.

Gary Lackmann, *Midlatitude Synoptic Meteorology*, 2011, American Meteorological Society

Howard B. Bluestein, *Synoptic-Dynamic Meteorology in Midlatitudes, Volume II: Observations and Theory of Weather Systems*, Oxford University Press, 1993.

Other supplemental material will be made available either on the class website, RamCT, or via e-mail.

Grading Policies

Course grading will be based on a combination of lab exercises, a midterm exam, and a final exam. The lab assignments will be worth 40%, the midterm exam will be worth 25%, and the final exam will be worth 35% of your final grade. Plus/minus grading will be used in the course.

Lab exercises

There will be a lab exercise assigned each week of class. These will involve applying the concepts discussed in class, and will often involve analyzing interesting recent synoptic-scale weather events. In general, the lab exercises will be handed out on Tuesdays and will be due on Fridays, although this schedule may vary during some weeks of the semester. On Tuesdays some initial discussion of the exercises will take place, and then on Thursdays there will be time set aside for working on the labs and for questions. Labs will be due on Fridays at 3 pm, and for every weekday that a lab is late 10% will be deducted from the grade. Any changes to this schedule will be announced in class.

Weather discussions

After each lecture but before the lab time, 15-20 minutes will be devoted to a class discussion of current or recent synoptic-scale weather and other interesting weather phenomena. Each student will be responsible for preparing and leading the discussion in class twice over the course of the semester. Furthermore, the student leading the discussion in class is also responsible for posting a brief written discussion in the online forum on RamCT. Weather discussions should be focused on understanding of physical/dynamical processes, not on forecasting rules. All students are also expected to participate in the daily discussions by asking questions or suggesting items of interest.

Class forecast contest

A class forecast contest will be conducted, with two separate "tournaments" separated by the midterm exam. Your forecasting performance will not affect your grade, but participation is expected. Forecasts will be made each day of class. More details will be provided in class.

Special needs

If you have special learning needs that should be accommodated in this class, please see the instructor during the first two weeks of the semester, and refer to <http://rds.colostate.edu/csuinfor/accommodations.asp> for more information.

Copyright policy

All materials used in this class are copyrighted. These materials include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless permission is expressly granted.

Academic Integrity and Plagiarism

Academic integrity is a crucial part of the vibrant learning community at Colorado State University and in the Department of Atmospheric Science. We expect all students to conduct their academic work with integrity, and particularly to avoid plagiarism. As commonly defined, plagiarism consists of passing off as one's own the ideas, words, writings, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of that person. Plagiarism is a violation of the University rules on academic integrity. If you plagiarize in your work you could lose credit for the plagiarized work, fail the assignment, or fail the

course. Plagiarism could result in expulsion from the university. Each instance of plagiarism, classroom cheating, and other types of academic dishonesty will be addressed according to the principles published in the CSU General Catalog (see <http://www.catalog.colostate.edu/Content/files/2012/FrontPDF/1.6POLICIES.pdf>)

In this course, students are generally allowed (and encouraged!) to discuss the lab assignments with each other, but each student is expected to do his or her own work and turn in his or her own assignment.

Tentative* Schedule for ATS540 (TR 1:00-2:50pm)

Dates	Topic	Lab exercise
21, 23 August	Syllabus; Introduction; Definitions; Basic variables and equations; Observing systems	
28 August	Atmospheric thermodynamics (Vanessa teaching)	Surface data and analysis
30 August	Short class, will reschedule lecture at time of mutual agreement	
4, 6 September	Atmospheric thermodynamics continued	Temperature and thickness
11, 13 September	Atmospheric dynamics	Skew-T diagrams and stability
18, 20 September	Atmospheric dynamics continued	Isoentropic analysis
25, 27 September	Clouds and precipitation	Wind balances
2, 4 October	Air masses and fronts; midterm review	Radar and satellite observations
9, 11 October	Midterm exam (specific date TBD) Air masses and fronts, continued	NONE
16, 18 October	Upper-level flow patterns; jets and jet streaks	Thermal wind
23, 25 October	Upper-level flow patterns; jets and jet streaks cont'd	Fronts and frontogenesis
30 October, 1 Nov.	Quasi-geostrophic theory, vertical motion	Jets and jet streaks
6, 8 November	Extratropical cyclones (Russ out of town)	Vertical motion; Q-G diagnostics
13, 15 November	Extratropical cyclones, continued	Extratropical cyclones
20, 22 November	NO CLASS – Thanksgiving break	NONE
27, 29 November	Miscellaneous flows	Case study
4, 6 December	Other unfinished topics; final exam review	NONE
Thurs. 13 December	FINAL EXAM, 2-4 pm	

*Other topics may also be inserted into the schedule as time and student interest allow. It is also possible that topics will be rearranged if a particularly interesting weather event occurs that relates to one of the topics. If major changes are to be made during the semester, an updated version of the schedule will be provided.