ATSC 3032, Weather Analysis and Forecasting: Syllabus Spring 2013

Instructor: Dr. B. Geerts, geerts@uwyo.edu, 6062 Eng Bldg, 766-2261.
Lab instructor: Dr. Yonggang Wang, wyg@uwyo.edu, 6040 Eng Bldg.

Office hours: MWF 8-10 am. We are in our office most other times, just drop in.

Class schedule:
Tue 1:20-2:35 pm in EN6085
Thu 1:20-2:35 pm in EN6085 or EN1041

Textbook: Lackmann, G. 2011: Midlatitude Synoptic Meteorology (AMS)
There will be handouts also, and some online material at **http://www.atmos.uwyo.edu/~geerts/atsc3032/**

Useful books:
Lynch and Cassano, 2006: Applied atmospheric dynamics, 1st Edition, Wiley.
Martin, 2006: Mid-latitude atmospheric dynamics, 1st Edition, Wiley.

Course topics:

This course introduces the student to basic atmospheric processes through the display, analysis and interpretation of operational meteorological data. This includes surface data, upper-air maps, sounding data, satellite, radar and profiler data, as well as 4-D numerical weather prediction (NWP) model output. The students will become familiar with IDV, and possibly other software, for the display of meteorological data.

The course is structured along two parallel, simultaneous tracks:

Weather data interpretation

first class meeting of the week

1. basics of large-scale flow (textbook, Chap 1)
   a. scales of atmospheric motion
   b. coordinate systems
   c. the governing equations
   d. gph, thickness, thermal wind
   e. vorticity
   f. micrometeorology
2. soundings and aerological diagrams (handout)
   a. introduction to a skew T
   b. conserved variables and static stability
   c. conditional and potential stability
   d. estimating thunderstorm intensity
3. analysis of surface weather charts:
   a. Chap 6.1: what are fronts?
   b. Chap 6.4: types of fronts
   c. standard display of METAR data
   d. Chap 12: analysis of isobars and fronts
4. satellite and radar imagery: basic principles and interpretation (ppt and METED online)
   a. satellite visible, IR, water vapor
   b. satelite passive microwave
   c. sounders, surface and upper level winds
   d. radar reflectivity & weather

IDV (taught by Dr. Wang)

second class meeting of the week (starts in week 2)

1. overview, intro to the GUI, zooming, panning, rotating; view & projection menus, backgrounds
2. data selection (data source chooser, field selector, controls)
3. creating, saving and using bundles
4. soundings: skew T display
5. 3D gridded data
6. point observations: surface data
7. using IDV for your case study
8. diagnostic functions (formulas and Jython)
9. satellite and plan-view radar data
10. full-volume (3D) radar data display
11. upper-air displays
12. trajectory data, wind profiler data, aircraft data
13. the use of IDV to display other geo-data in Earth System Science

e. radar radial velocity

Course grading:

Midterm (Thu 14 March)	20%
Final exam (Tue 7 May 1:15 pm)	30%
Take-home assignments (6 total, 4% each)	24%
Case study presentations	20%
Class participation etc:	6%

Case study presentations

You are asked to give two 20 minute oral presentations about some interesting weather event in the forecast, or in the recent or more distant past. For your first talk, you need to use imagery available online. There is a list of useful web links at the ATSC 3032 site, or you can use/find your own. For your second talk, you must use IDV. Here are some suggestions about your second case study:

- You can use various data servers accessible in IDV, or you have to download the data (not just images). This includes model output, radar, satellite, surface, and upper-air data. One of the homeworks will show you how to download archived data. The data can be viewed in IDV (Integrated Data Viewer) (http://www.unidata.ucar.edu/software/idv/). We 'll learn how in the lab sessions.
- Your analysis must be done in IDV, where you can save images. Your presentation can be in IDV, in fact some 3D displays or animations are best done in IDV. But some bundles may be slow to load. So you may want to save the IDV images, and put them together into a presentation in powerpoint. That gives you the opportunity to structure your talk and add some text into the images. If you choose powerpoint, make sure to be ready to pull up some images in IDV upon request, during your presentation. (that is, have IDV open).

Here are some presentation tips:

- Don't just give a general overview of the weather. Instead, focus on a particular topic. You can choose a specific weather phenomenon, such as the structure and evolution of a frontal disturbance, lake-effect snow, a thunderstorm outbreak. You can also address a specific question (predictability, geostrophic balance, stability…)
- Explain what is shown, and provide the necessary background info if needed.
- The best briefing demonstrates your ability to do some good science and to present this well. Good science means an ability to pick up some interesting weather phenomenon, and the formulation and testing of a hypothesis. The mere mentioning of 'known' concepts about weather is inferior to the questioning of these concepts.
- Come see me in advance, if you have questions about your case.
- Start early analyzing your case. You need several weeks to be able to plot good images in IDV, to understand what is shown, and to put it together into a good presentation
- Presentation will be timed and is limited to 20 minutes. Questions/answers can follow afterwards. No write-up (report) is required, so the assessment is based entirely on your presentation!
- Presentations are assessed by peers and by me.
- The audience (other students) should actively participate with questions.

Schedule:

name	date 1st talk	date 2nd talk
Janet Byrd	2/14	4/18
Keith Carrico	2/19	4/16
Melinda Caskey	2/21	4/11
Dillon Dodson	2/26	4/9
Justin Fullenwider	2/28	4/4
Clifton Kelly	3/5	4/2
Brandy Talbot	3/7	3/28

A note on Academic Integrity and Plagiarism

Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at the University of Wyoming, and all students are expected to act in accordance with this principle. Consistent with this expectation, all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic integrity includes a commitment *not to engage in or tolerate acts of plagiarism, falsification, misrepresentation, or deception*. Such acts of dishonesty violate the fundamental ethical principles of the academic community and compromise the worth of work completed by others.

Evidence of plagiarism may result in expulsion from the course (with an F grade) as well as dismissal or suspension from the University of Wyoming (Unireg #030-1970).

Students with disabilities

If you have a physical, learning, or psychological disability and require accommodations, please let the instructor know as soon as possible. You must register with, and provide documentation of your disability to University Disability Support Services (UDSS) in SEO, room 330 Knight Hall.