11:670:211 Meteorological Analysis
Course Syllabus
Fall 2019

Instructor Information

Instructor: Dr. Steven G. Decker
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Textbook

Required: *Synoptic Analysis and Forecasting: An Introductory Toolkit*, by Shawn Milrad (ISBN 978-0-12-809247-7)

Learning Goals

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

1. Conduct a weather discussion and apply diagnostic, prognostic, and technological tools to evaluate atmospheric processes across a multitude of scales. (PLG 1)
2. Apply critical and analytical thinking to solve relevant scientific problems in both individual and collaborative settings. (PLG 3)
3. Effectively communicate scientific information orally and in writing, including by electronic means, at an appropriate level for their audience. (PLG 4)
4. Demonstrate mastery of the mathematical and physical foundations of meteorology and climatology as well as key atmospheric processes that occur at a variety of spatial and temporal scales. (PLG 5)

Purpose of the Course

Weather information is readily accessible over the internet, but what does all this information mean, and how can we use it to make forecasts? Broadly speaking, the purpose of this course is to get you down and dirty with real meteorological data to answer these questions. We will examine in-situ observational data, human-generated data, computer-generated data, and remotely sensed data. We will also participate in the WxChallenge throughout the semester to get our feet wet with weather forecasting.

Grading Procedures

Class activities will contribute to your final grade as follows:

Class Exercises	35%	(to be assigned where indicated by ✓)
Weather Discussions	20%	
Midterm Exam	20%	Monday, October 28
Final Exam (comprehensive)	25%	Wednesday, December 18, 8 AM, **ENR 223**

Exams will be given on October 28 and December 18. **If you have an issue with either of these dates, you must let me know immediately!** Although the final is comprehensive, it will focus mostly on topics covered after the midterm.

Class exercises are due at the beginning of class one week after they are assigned. Often, you will have time to work on them in class, perhaps on the following class day. Sometimes, these assignments will require computer resources to complete. **Bring colored pencils!**

Weather discussions are held at the beginning of each class. They last 10–15 minutes. Half of your weather discussion grade is based on how you perform when leading the discussion; the other half is based on your attention when you are not leading the discussion (e.g., prompt attendance, asking questions, making comments, not Snapchatting, not sleeping). You are also welcome (but not required) to attend weather discussions led by the seniors on Fridays at 12:35 PM in Room 223, as well as the medium-range discussions held with our private-sector partners on Tuesdays at 11 AM.

We will participate in the WxChallenge, which is an intercollegiate forecasting contest administered by the University of Oklahoma. In this contest, we will issue forecasts four times a week (Mondays through Thursdays), with the forecast city fixed for two weeks at a time. This contest runs throughout the school year; this semester it will begin September 30 and end December 13. For this contest, you are only graded on your participation, but if you beat me over the course of the semester, I will award you one bonus percentage point on your final grade. In addition, if you win your division of the contest for a particular forecast city, you will receive one bonus percentage point on your final grade.

Your final percentage grade in the course will be a number between 0 and 106. These percentages will be converted to grades using the following scale:

A	91+	C	70–75
B+	86–90	D	60–69
B	81–85	F	<60
C+	76–80		

The grade cutoffs may be lowered, but they will never be raised. That is, a 91 is guaranteed to be an A, but a 90 may end up being an A as well.

Late Assignment Policy

I expect homework to be submitted on the given due date. However, I understand that unforeseen circumstances (e.g., illness, family emergency, computer crash, etc.) may hinder your ability to meet the due date. Thus, **you have two "late days" that you may use over the course of the semester.** You may turn in one assignment two days late, or two assignments one day late each, without being penalized. (Going from Friday to Monday counts as one day instead of three.)

Upon using your two late days, a late assignment will incur a 10-percentage-point drop for each day it is late, no matter what reason you have for being late.

Absence Policy

I don't keep track of attendance. However, I do keep track of your participation in the WxChallenge. **You have four free missed forecasts!** Each missed forecast after four will result in percentage point deductions off your final grade. I will not accept excuses for additional absences. EXAMPLE: Joe has a 91% for the course, but misses six WxChallenge forecasts. Subtracting four gives two left over, so Joe's final grade will be reduced by 2 percentage points to 89%.

Please use the Rutgers absence-reporting website at https://sims.rutgers.edu/ssra/ to automatically generate emails to each of your professors.

Your Feedback

I have taught this course many times. Most things will go right, but unfortunately, some things may go wrong. I welcome any feedback (positive or negative) you have about this course. You can provide this feedback in two ways:

- E-mail me, or talk to me directly. Not anonymous, but very effective.
- Slip an anonymous note in my mailbox.

Schedule

Date		*Topic*	*Reading*	
September	5	Introduction, computer setup, time zones, and geography	1.1	✓
	9	Weather discussions; units for temperature and pressure	1.2	
	12	METARs and the station model	2	
	16	Decoding METARs	3	✓
	19	NWS text data		
	23	Interpreting upper-air maps	4	
	26	Analysis of upper-air observations	5	✓
	30	Analysis of upper-air observations II	6	
October	3	Kinematics	7.1–7.3	
	7	Plotting vorticity and divergence		✓
	10	Advection	7.4, 8.2	
	14	Weather station field trip		
	17	Plotting advection	9	✓
	21	Geostrophic wind		
	24	Thickness and the hypsometric equation	8.1	✓
	28	**Midterm Exam**		
	31	Numerical weather prediction		
November	4	Model output statistics & BUFKIT		
	7	Ensemble forecasting		
	11	Analysis of surface observations	10	✓
	14	Analysis of surface observations II		
	18	Synoptic climatology and forecasting tips	15	✓
	21	Vertical structure of the atmosphere		
	25	The skew-T diagram	13.1, 14	✓
	26	Severe weather parameters (NOTE: Thur. schedule)	13.2	
December	2	Plotting severe weather parameters		✓
	5	Satellite imagery	11	
	9	Radar imagery	12	
	18	**Final Exam** (8–11 AM)		