11:670:211 Meteorological Analysis
Course Syllabus
Fall 2022

Instructor Information

Instructor: Dr. Steven G. Decker
Office: ENR 227
Phone: 848-932-5750
E-Mail: decker@envsci.rutgers.edu
Office Hours: M 4–5 and F 11–12

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%	Thursday, October 27
Final Exam (comprehensive)	25%	Tuesday, December 20, 12 PM, ENR 323

Exams will be given on October 27 and December 20. **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 TikToking, not sleeping). You are also welcome (but not required) to attend weather discussions led by the seniors on Fridays at 12:25 PM in Room 223.

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 the contest begins September 26 and ends December 12. 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 three "late days" that you may use over the course of the semester.** You may turn in one assignment three days late, or three assignments one day late each, or some other combination, without being penalized. (Going from Friday to Monday counts as one day instead of three.)

Upon using your three 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 six free missed forecasts!** Each missed forecast after six 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 10 WxChallenge forecasts. Subtracting six gives four left over, so Joe's final grade will be reduced by 4 percentage points to 87%.

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	6	Introduction, computer setup, time zones, and geography	1.1	✓
	8	Weather discussions; units for temperature and pressure	1.2	
	13	METARs and the station model	2	
	15	Decoding METARs	3	✓
	20	NWS text data		
	22	Interpreting upper-air maps	4	
	27	Analysis of upper-air observations	5	✓
	29	Analysis of upper-air observations II	6	
October	4	Kinematics	7.1–7.3	
	6	Plotting vorticity and divergence; Larry CES		✓
	11	Advection	7.4, 8.2	
	13	Weather station field trip		
	18	Plotting advection	9	✓
	20	Geostrophic wind		
	25	Thickness and the hypsometric equation	8.1	✓
	27	**Midterm Exam**		
November	1	Numerical weather prediction		
	3	Model output statistics & BUFKIT		
	8	Ensemble forecasting		
	10	Analysis of surface observations	10	✓
	15	Analysis of surface observations II		
	17	Synoptic climatology and forecasting tips	15	✓
	22	Vertical structure of the atmosphere		
	29	The skew-T diagram	13.1, 14	✓
December	1	Severe weather parameters	13.2	
	6	Plotting severe weather parameters		✓
	8	Satellite imagery	11	
	13	Radar imagery	12	
	20	**Final Exam** (12–3 PM)		

Academic Integrity

See http://nbacademicintegrity.rutgers.edu/ for information on the university's policy on Academic Integrity. The principles of academic integrity require that a student:

- Properly acknowledge and cite all use of the ideas, results, or words of others.
- Properly acknowledge all contributors to a given piece of work.
- Make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of impermissible materials or impermissible collaboration.
- Obtain all data or results by ethical means and report them accurately without suppressing any results inconsistent with his or her interpretation or conclusions.
- Treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress.
- Uphold the canons of the ethical or professional code of the profession for which he or she is preparing.

Adherence to these principles is necessary in order to ensure that

- Everyone is given proper credit for his or her ideas, words, results, and other scholarly accomplishments.
- All student work is fairly evaluated and no student has an inappropriate advantage over others.
- The academic and ethical development of all students is fostered.
- The reputation of the University for integrity in its teaching, research, and scholarship is maintained and enhanced.

Failure to uphold these principles of academic integrity threatens both the reputation of the University and the value of the degrees awarded to its students. Every member of the University community therefore bears a responsibility for ensuring that the highest standards of academic integrity are upheld.

Student Wellness Services

Counseling, ADAP & Psychiatric Services (CAPS)
(848) 932-7884 / 17 Senior Street, New Brunswick, NJ 08901
http://health.rutgers.edu/medical-counseling-services/counseling/

CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professionals within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.

Violence Prevention & Victim Assistance (VPVA)
(848) 932-1181 / 3 Bartlett Street, New Brunswick, NJ 08901
http://vpva.rutgers.edu/

The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty.

Disability Services
(848) 445-6800 / Lucy Stone Hall (54 Joyce Kilmer Ave), Suite A145, Piscataway, NJ 08854
https://ods.rutgers.edu/

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: https://ods.rutgers.edu/students/documentation-guidelines. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: https://ods.rutgers.edu/students/registration-form.

DoSomething button through Rutgers Dean of Students office:
http://health.rutgers.edu/do-something-to-help/

Wellness Coaching through Rutgers HOPE:
http://health.rutgers.edu/education/hope/wellness-coaching/

Self-Help Apps found on the Rutgers Student Health website:
http://health.rutgers.edu/education/self-help/self-help-apps/

NJ Hopeline: (855) 654-6735

National Suicide Hotline: (800) 273-8255