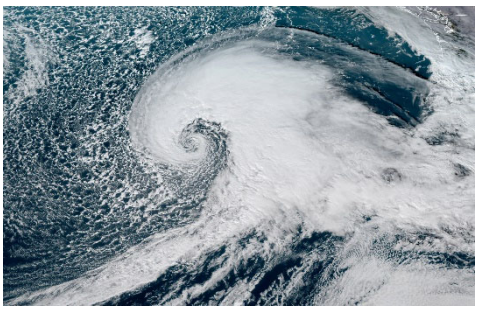
WEATHER FORECASTING
ATMS 350
SPRING 2024

Despite advances in numerical weather prediction models, human forecasters add significant value to computer-generated weather forecasts. Whether you make a career out of daily operational forecasting or simply develop informal forecasts for friends and family on occasion, the ability to assess the current state of the atmosphere and determine its likely future state remains a critical skill for all meteorologists. This course, in combination with the theoretical and mathematical treatment of various topics in other courses within the atmospheric sciences curriculum, will prepare you to take on the role and responsibilities of an operational forecaster.



PURPOSE

This course is designed to provide you—a future meteorologist—with practical experience with the weather forecasting process and to train you to forecast weather using a variety of modern techniques and tools.

OBJECTIVES

Throughout the course, you will develop and refine your weather forecasting skills as you 1) lead and participate in lively map discussions, 2) actively participate in the WxChallenge forecasting competition, 3) identify weather forecasting organizations and understand their roles, 4) interpret meteorological data, including satellite, radar, surface, and upper-air observations, 5) construct and interpret subjective (hand-drawn) map analyses, 6) interpret and evaluate model output from the wide array of numerical guidance options, 7) comfortably use a skew T–log p diagram for forecasting purposes, 8) apply forecast verification techniques, and 9) develop short-, medium-, and long-range weather forecasts.

PROFESSOR

Dr. Christopher Godfrey
Office: Rhoades/Robinson Hall, room 253
Phone: 828-232-5160
E-mail: cgodfrey at unca dot edu
Office hours: 3:45–4:45 p.m. Wednesdays and 12:45–1:45 p.m. Thursdays, or by appointment. You may call my office (it bounces to my cell phone) during regular business hours. You may send me as many email messages as you wish. If my door is open at any other time, please drop in.

CLASS INFORMATION

Meeting times:	MW 9:30–10:45 a.m.
Location:	Robinson Hall, room 238
Required text:	None.
Optional text:	Vasquez, T., 2021: *Weather Analysis & Forecasting Handbook.* 2nd ed. Weather Graphics Technologies, 340 pp. (ISBN-13: 9780996942348).
Website:	https://www.atms.unca.edu/cgodfrey/courses/atms350/

» Please visit https://weather.unca.edu for a list of learning outcomes for the Department of Atmospheric Sciences.

GETTING QUESTIONS ANSWERED

I will be either in my office or available on Google Meet during scheduled office hours (find the QR code on my door). Just drop in. If at any other time you have a question and my office door is open, you are more than welcome to visit. Otherwise, email is by far the best way to reach me and you will usually get a speedy reply. You may also schedule an appointment with me. Please don't hesitate to ask questions about class, other coursework, or the stresses of college life whenever the need arises.

IMPORTANT DATES

Monday, 22 January 2024	WxChallenge forecasts begin	Daily by 0000 UTC
Wednesday, 20 March 2024	**Midterm Exam**	In class
Monday, 6 May 2024	**Final Exam***	8:00–10:30 a.m.

*No student, including graduating seniors, may take the final exam at an earlier time.

COURSE OUTLINE

This course outline is subject to modifications, depending on the interests of the class and available time.

1. WxChallenge overview and instructions
2. Forecasting organizations
3. Forecast philosophy and decision making
4. Skew T–log p diagrams
5. Precipitation type forecasting
6. Surface and upper-air map analysis and interpretation
7. Numerical models
8. Radar products and interpretation
9. Satellite products and interpretation
10. Forecast verification
11. Severe weather forecasting
12. Tropical weather forecasting
13. AWIPS II
14. Isentropic analysis
15. Aviation forecasting

REQUIRED ACTIVITIES

Daily map discussion: An important component of the course is a daily map discussion. Each of you will take turns leading the map discussion. This is not a weather briefing! A lively map discussion requires a conversation among peers regarding some interesting aspect of the current state of the atmosphere. This may or may not include a forecast. Your participation in *every* map discussion is crucial for everyone's learning and is an important part of your grade.

WxChallenge forecasts: The WxChallenge is a national collegiate forecast competition. You will submit daily forecasts of the high and low temperature, maximum sustained wind speed, and total precipitation for select locations at www.wxchallenge.com.

Group forecasts: You will work in small groups to produce forecasts for interesting weather events. We will discuss the forecasts, your reasoning, and the observed weather in the next class.

EVALUATION

There will a midterm exam and a comprehensive final exam to assess your progress through the semester. The midterm exam will take place during the class meeting time. Several homework exercises will strengthen your skills and reinforce the lecture material. These exercises will be assigned as we make sufficient progress on each topic, but you can expect approximately one assignment every one and a half to two weeks and you will have one week to complete each assignment. Active participation in map discussions and group activities, either in-person or remotely, is expected.

Please note the deadlines for each type of assignment:

- Map discussions must be presented at the **beginning of the class period**.
- WxChallenge forecasts are due by **0000 UTC** Tuesday through Friday (i.e., Monday through Thursday evening).
- Group forecasts are due at the beginning of the class period unless assigned as an in-class exercise.
- Homework assignments are due **via Moodle at 5:00 p.m.** on the scheduled due date.

There will be no opportunities for make-up exams. Exams must be taken on the scheduled date and at the scheduled time. Daily participation, either in-person or remotely, is required in map discussions. If you miss the class, you miss

the grade. The *only* exceptions to this rule are: (1) serious medical condition (illness or injury) of you or an immediate family member; (2) University excused absence; (3) jury duty; or (4) military orders. Only in such instances will an exam be dropped or rescheduled depending on your best interests or will a grade penalty be waived for a late assignment or missed class. I will accept completed assignments up to 24 hours late (5:00 p.m. the following day) for a 50% late penalty. *Assignments more than 24 hours late will not be graded*. In the event of an unforeseen circumstance that causes you to miss a class or due date, *you must notify me by phone or e-mail within 24 hours of the event*. Appropriate documentation should be attached to a late assignment. Please review the guidelines for submitting homework, available on Moodle, prior to submitting your first assignment.

GRADING

Map discussion (as leader)	5%
Map discussion daily class participation	15%
Group forecasts	5%
WxChallenge forecast competition	20%
Midterm exam	20%
Homework assignments	15%
Final exam	20%

I reserve the option to curve the final grades upward at my discretion. However, you are guaranteed *at least* the following based on your final score before applying any curve:

A	≥92.0%	C	72.0–77.9%
A-	90.0–91.9%	C-	70.0–71.9%
B+	88.0–89.9%	D+	68.0–69.9%
B	82.0–87.9%	D	60.0–67.9%
B-	80.0–81.9%	F	<60.0
C+	78.0–79.9%		

Final grades are not negotiable. If you see a problem with any other grade, you may plead your case no later than 14 days from the date I return the assignment to the class. I do make mistakes. Under no circumstances will your grade be *lower* if you see me with a question.

WXCHALLENGE GRADING

Your WxChallenge grade is based on the weighted average of the mean score for each forecast city (calculated by the WxChallenge scoring algorithm) at the end of the fall competition (40%), a missed forecast penalty (50%), and forecast score variance (10%), plus a bonus for improvement over the semester. The mean score grade is 100 if the mean score is less than –1, 95 if the mean score is less than 0, 90 if the mean score is less than 1, and so on with a 5-point reduction for each integer increase in score. Each missed forecast (shown in the results as a climatological forecast) will result in a 5-point penalty for the missed forecast score. A default model guidance forecast will receive a 1-point penalty. Variance in the WxChallenge score is a measure of consistency for each city. Lower variance is better. Variance less than 10 (dimensionless) earns a 100, less than 15 earns 95, and so on with the following variance/grade pairs: 30:90, 60:85, 90:80, 120:75, 150:70, 200:65. Variance greater than 200 earns a 60. A bonus will be awarded for marked improvement (but please do not perform poorly in the beginning on purpose).

ACADEMIC INTEGRITY

Since the point of this or any class is to learn, you may collaborate on assignments, but *you absolutely must make sure that you hand in your own work and that you understand the material*. Copying your friend's answers will not only be obvious to me, but will result in both of you sharing the credit for that answer. For example, if you do a fantastic job on an assignment and then let three of your friends copy *any part of it*, you will each receive a maximum grade of 25% for the assignment. I have zero tolerance for academic misconduct and will deal with the problem by immediately filing charges through the regular University channels. While discussion on WxChallenge forecasts is encouraged, each forecaster must make his or her own forecast. Copying someone else's forecast will result in suspension from the contest.

COMPUTERS IN THE CLASSROOM

I ask that you please refrain from using desktop or laptop computers for anything other than academic purposes related to the class. This means that Facebook, email, sports scores, and even weather updates must wait until after class unless they are specifically related to the topic of discussion. Unless you have prior permission, inappropriate and distracting mouse clicks and screen tanning sessions will earn you an invitation to leave the room.

NOTES

University of North Carolina at Asheville is committed to making courses, programs and activities accessible to persons with documented disabilities. Students requesting accommodations and/or academic adjustments must do so through the Office of Academic Accessibility and may be required to provide supporting documentation. All information provided will remain confidential. For more information, please contact the Office of Academic Accessibility at (828) 232-5050 or academicaccess@unca.edu or visit them in the Academic Success Center.

PANDEMIC ADDENDUM

Students who attend class in-person instead of virtually tend to earn better grades. Yet common illnesses and new variants of the COVID-19 virus still circulate, and I want this and every classroom to be a safe and healthy place for everyone. Please always demonstrate respect for yourself, your classmates, your professor, and their families and friends. If you have been exposed to COVID-19, influenza, RSV, or any other illness (i.e., someone you have been around within the last three days has tested positive or displayed obvious symptoms), tested positive yourself within the past five days, or have any symptoms (e.g., fever, runny nose, congestion, sore throat, lethargy, etc.) please **DO NOT COME TO CLASS**. You can participate remotely via Zoom if you let me know of your need for a remote connection prior to 9:10 a.m. on the day of class. There will be *no penalty* if you need to participate remotely to promote safety!