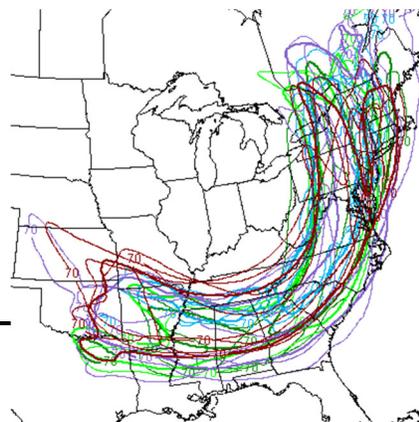


METEOROLOGICAL STATISTICS

ATMS 405

SPRING 2025

The applications of various statistical methods pervade the atmospheric sciences. From simple descriptive techniques to more complex analyses, meteorologists and climatologists routinely rely on statistical methods and procedures to draw conclusions about physical processes in the atmosphere, to analyze historical data, to forecast the weather, and to verify those forecasts. No matter what you plan to accomplish after you earn your degree from UNC Asheville, you will certainly benefit from a broad knowledge of the statistical methods used in the atmospheric sciences.



PROFESSOR

Dr. Christopher Godfrey

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Phone: 828-232-5160

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Office hours: **2:00–3:00 p.m. Tuesdays and 1:30–2:30 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 2:00–3:15 p.m.

Location: Robinson Hall, room 238

Required text: Wilks, D. S., 2019: *Statistical Methods in the Atmospheric Sciences*. 4th ed. Academic Press, 818 pp. (ISBN: 978-0-12-815823-4)

Website: <https://www.atms.unca.edu/cgodfrey/courses/atms405/>

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, you are more than welcome to call me or send me an email. E-mail 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 for an in-person or virtual meeting. Please don't hesitate to ask questions about class, other coursework, or the stresses of college life whenever the need arises.

IMPORTANT DATES

Wednesday, 5 March 2025	Midterm Exam	2:00–3:15 p.m.
Wednesday, 7 May 2025	Final Exam	11:30–2:00 p.m.

COURSE OUTLINE

This course outline is approximate, but the list of topics and corresponding book sections serves as an excellent schedule of reading assignments.

Date	Topic	Reading
13 January	AMS Annual Meeting–No Class	
15 January	AMS Annual Meeting–No Class	
20 January	Martin Luther King, Jr. Day–No Class	
22 January	Introduction, Probability	Chapter 1
27 January	Probability	Chapter 2
29 January	Probability	Chapter 2
3 February	Exploratory data analysis, Organizing data	3.1–3.2
5 February	Exploratory data analysis, Organizing data	3.3–3.4, except 3.3.6
10 February	Exploratory data analysis, Organizing data	3.3–3.4, except 3.3.6
12 February	Correlation	3.5–3.6
17 February	Discrete distributions	4.1–4.3

19 February	Discrete distributions	4.1–4.3
24 February	Continuous distributions	4.4–4.5
26 February	Continuous distributions	4.4–4.5
3 March	Sampling distributions, Testing	5.1
5 March	Midterm Exam	
10–12 March	Spring Break–No Class	
17 March	Midterm review	
19 March	Parametric tests	5.2
24 March	Parametric tests	5.2
26 March	Nonparametric tests	5.3
31 March	Nonparametric tests	5.3
2 April	Field significance, False discovery rate	5.4
7 April	Least squares regression	7.1–7.2
9 April	Least squares regression	7.3–7.4
14 April	Classical statistical forecasting, MOS, Perfect prog	7.9
16 April	Ensemble forecasting	8.1–8.2
21 April	Ensemble forecasting, Subjective probability forecasting	8.5, 7.10
23 April	Forecast verification (nonprobabilistic)	9.1–9.3
28 April	Forecast verification (probabilistic)	9.4–9.6
7 May	Final Exam	11:30–2:00 p.m.

EVALUATION

There will be homework assignments, one midterm exam, and one comprehensive final exam to assess your newfound knowledge of statistics. Expect about eight homework assignments, which will be due every one to two weeks as we make sufficient progress through the course. Homework is due at exactly 5:00 p.m. on the scheduled due date. Please plan accordingly. I will accept homework up to 24 hours late (5:00 p.m. the following calendar day) for a 50% late penalty. Homework more than 24 hours late will not be graded.

GRADING

Homework Assignments	50%
Midterm Exam	25%
Final Exam	25%

I reserve the option to curve the final grades upward at my discretion. In fact, it is highly likely that I will do so by applying statistical techniques. I also reserve the right to adjust the percentages shown here, but only if doing so would benefit the class as a whole.

ACADEMIC INTEGRITY

Since the point of this or any class is to learn, you may collaborate on homework assignments, but *you absolutely must make sure that you hand in your own work.* If you choose to use a data analysis package, such as Excel, then you may not share worksheets, nor may you share R or Python code. Please enter any necessary data, formulae, or code and create charts on your own. 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 the homework 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. The midterm and final exams are open book and open notes, but you may not consult classmates or use your phone, supplemental materials, or the Internet.

NOTES

The University of North Carolina 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.

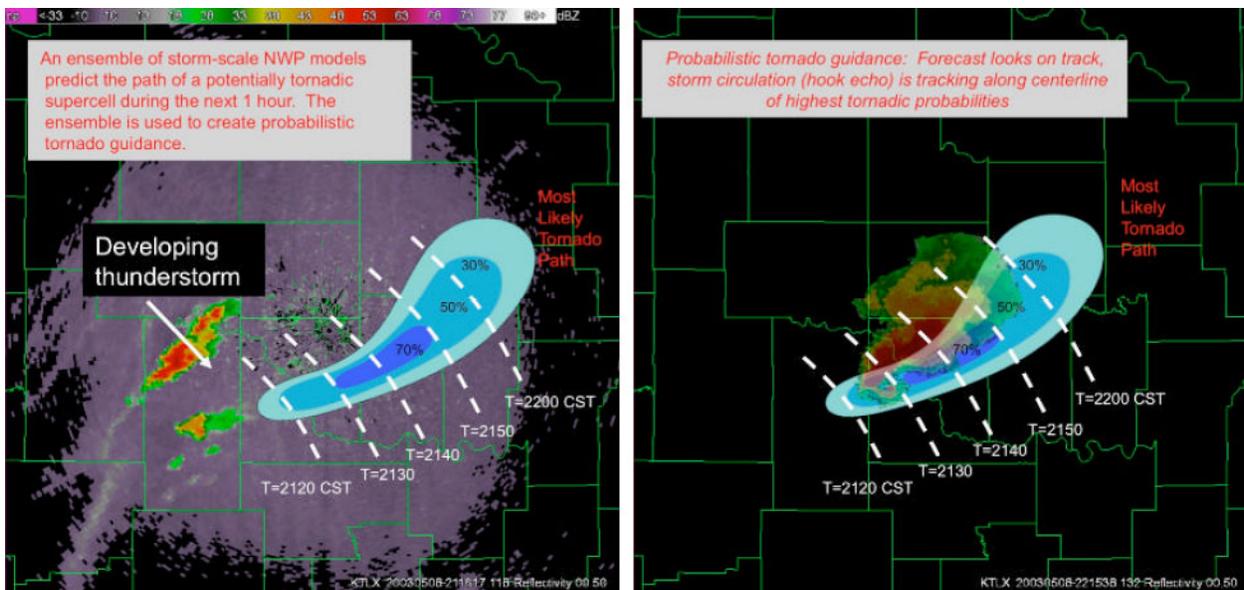
FURTHER NOTES

- Those who are graduating this semester may not take the final exam at a different time.

- Some homework problems will require plots or analyses that a program or software package may handle best. You are welcome to learn and use any available package or programming language (e.g., Excel, Python, Matlab, RStudio, SAS, etc.). See https://en.wikipedia.org/wiki/List_of_statistical_software for a comprehensive list of options.

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've 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**. I can livestream this course via Zoom with sufficient notice (send me an email a few hours beforehand). I will also make pre-recorded lecture videos available to everyone to help you study. There will be *no penalty* if you need to participate remotely to promote safety!



A conceptual illustration of a convective-scale warn-on-forecast system (NSSL, <http://www.nssl.noaa.gov/projects/wof>).