

# 11:670:434 Weather Analysis and Forecasting II: Mesoscale Meteorology Course Syllabus Spring 2024

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Office Hours: W 11–12:30 (or by appt.)      Office Hours: M 10–12

Textbooks: Required- Markowski and Richardson: *Mesoscale Meteorology in Midlatitudes*  
Supplemental-Lackmann: *Midlatitude Synoptic Meteorology (L)*

Grading:

|                            |              |     |  |
|----------------------------|--------------|-----|--|
| Exams                      | 2 @ 10% each | 20% | (Feb 27 and April 9, ENR 323) <sup>1</sup> |
| Final Exam (comprehensive) |              | 15% | (May 7, 12 PM)                             |
| Lab Exercises              |              | 50% |  |
| Weather Discussions        |              | 15% |  |

Class periods will often proceed as follows:

2:00–2:20 Weather Discussion (Graded as before: 75% performance; 25% participation)  
2:25–3:15 Lecture  
3:25–5:00 Lab Time

There will be days with an expanded lab and no lecture. I'll announce these days via Canvas.

## 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. 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).

## NBFG and WxChallenge

We will continue to participate in the NBFG and WxChallenge. Participation in these contests is *mandatory*. However, you need not worry about forecast worksheets and bust summaries.

- For each contest, if you beat Alex **or** me, you earn one bonus percentage point on your final grade.
- For each contest, if you beat Alex **and** me, you earn three bonus percentage points on your final grade.
- If you win your division for a WxChallenge city, you will earn one bonus percentage point on your final grade.
- If you win the NBFG Tournament Challenge, you will earn one bonus percentage point on your final grade.
- I'll sum your absences from the contests, and for every missed forecast after *four*, you will lose one percentage point on your final grade.

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<sup>1</sup> If you object to an exam date, let me know by the end of this week!

The Friday lunchtime weather discussions are no longer part of the course. However, any student (or team of two) wishing to lead a discussion tailored to this course on a Friday may do so and receive half a bonus percentage point on your final grade. You may only do this once, and you must notify me at least 48 hours in advance.

### Overview

Throughout the semester, we will focus on three main topics:

- Winter weather
- Mesoscale circulations
- Convective weather

At the end of the course, you will be able to diagnose and predict complex meteorological scenarios involving any (or all!) of these themes. Hard work and dedication will be required!

### Late Assignment Policy

I expect homework to be handed in 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 any other combination of three days, without being penalized. (Going from Friday to Monday counts as one day instead of three.)

Upon using up your three late days, a late assignment will incur a 10-percentage point drop for each day it is late.

## Syllabus

| <u>Date</u>       | <u>Read</u>   | <u>Topic</u>  | <u>Wx Disc Round†</u> |
|-------------------|---------------|---|-----------------------|
| 1/16              | 1.1–1.2       | Definition of Mesoscale                                 | 0                     |
| 1/18              | L9.2–3        | Precipitation Type                                      | 0                     |
| 1/23              | 13.2, (L8)    | Freezing Rain Climatology                               | 0                     |
| 1/25              |               | Forecasting of Heavy Snow                               | 1                     |
| 1/30              |               | NO CLASS (See you in                                    |                       |
| 2/1               |               | NO CLASS Baltimore)                                     |                       |
| 2/6               |               | No Lecture*   | 1                     |
| 2/8               |               | Assessing Conditions for an East Coast Cyclone          | 1                     |
| 2/13              | 3.2–3.4       | Mesoscale Snow Bands: Conditional Symmetric Instability | 1                     |
| 2/15              | 4.5, (L9.4)   | Mesoscale Snow Bands: Lake Effect Snow                  | 2                     |
| 2/20              | 2.4, 5.4      | Mesoscale Circulations Forced by Diabatic Heating       | 2                     |
| 2/22              | 6.1–6.6       | Internal Gravity Waves and Forecast Verification        | 2                     |
| 2/27              |               | EXAM I  |                       |
| 2/29              | 11.1–12.4     | Mesoscale Circulations Forced by Terrain                | a                     |
| 3/5               | L10.6, 11.3.2 | Ensemble Forecasting and QPF                            | 2                     |
| 3/7               | 2.1, 2.3.3    | No Lecture*   | 2                     |
| 3/12              |               | NO CLASS  |                       |
| 3/14              |               | NO CLASS  |                       |
| 3/19              | 2.5–2.6, 3.1  | Assessing Instability – Skew-Ts                         | 3                     |
| 3/21              | 2.7, 8.1      | Assessing Vertical Wind Shear – Hodographs              | 3                     |
| 3/26 <sup>§</sup> | 5.2–5.3       | Mesoscale Boundaries and Mesoanalysis                   | 3                     |
| 3/28              | 8.2–8.4.2     | Stormscale Variation – Storm Types                      | 3                     |
| 4/2 <sup>§</sup>  | 7.1–7.2       | Synoptic Patterns Favorable for Severe Weather          | 4                     |
| 4/4               | A.1.1–3.2     | Radar Interpretation for Severe Wx Prediction           | 4                     |
| 4/9               |               | EXAM II   |                       |
| 4/11              | 8.4.3–5, 10.1 | Tornadogenesis  | 4                     |
| 4/16 <sup>§</sup> | 10.2–10.3     | SPC Overview  | 4                     |
| 4/18              | 9.1–9.5       | Mesoscale Convective Systems                            | 4                     |
| 4/23 <sup>§</sup> |               | No Lecture*   | 0                     |
| 4/25              | 10.4          | Flash Flooding  | 0                     |
| 5/7               |               | FINAL EXAM (12 PM)                                      |                       |

\* Days marked as having no lecture could occur earlier or later than scheduled depending on weather conditions.

† 0 = Led by Dr. Decker and Alex; a = Led by special guest

§ NBFG Tournament