

**METR 4350 / ESCI 5350  
MESOSCALE METEOROLOGY  
SPRING 2021**

**Instructor:** Dr. Matthew Eastin  
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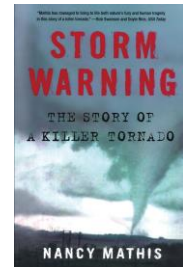
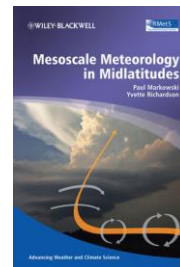
**Class Time:** Monday / Wednesday at 4:00 – 5:15 pm  
**Class Location:** Virtual (100% online - synchronous)

**Office:** Zoom meetings  
**Office Hours:** By appointment

**Teaching Assistant:** None

**Text (Required):** **Mesoscale Meteorology in Midlatitudes**  
Paul Markowski and Yvette Richardson  
Wiley-Blackwell Publishing

**Storm Warning: The Story of a Killer Tornado**  
Nancy Mathis  
Simon and Schuster Publishing



**Course Description:** This course provides a comprehensive study of the structure, evolution, and dynamics of atmospheric phenomena having spatial scales between 2 and 2,000 km. Topics include fronts, convective initiation, mesoscale convective systems, severe storms, tornadoes, dry lines, land-sea breezes, and terrain effects.

**Course Student Learning Objectives (SLOs):**

1. Differentiate between ordinary, multicell, and supercell convection.
2. Explain physical processes relevant to the formation and evolution of mesoscale convection.
3. Forecast mesoscale convection and severe weather potential using multi-level spatial analyses, sounding-based parameters, and weather radar observations.
4. Prepare a concise and informative mesoscale weather briefing on current events.

**Programmatic Student Learning Objectives (SLOs):**

1. Develop sufficient knowledge to describe, analyze, and forecast the three-dimensional structure, evolution, and dynamics of the atmosphere. (Meteorology – SLO1)
2. Demonstrate the ability to understand the climate system and apply this knowledge to improve human systems. (Meteorology – SLO2)
3. Practice oral communication skills to a degree whereby one can effectively communicate a scientific topic to the public. (Meteorology – SLO3)

**Course Policies:**

Attendance and Participation: Attendance is essential to maintaining an effective learning environment. Regular class attendance and active participation is expected. **All virtual classroom cameras must remain on throughout each class period.** Use of cell/smart phones, email, texting, and/or personal music players during class is strictly prohibited.

Course Etiquette: Open and mutually respectful communication of varied opinions, beliefs, and perspectives during online discussion encourages the free exchange of ideas that is essential to higher learning and to the ability to learn from each other. Students are expected to display tolerance for others' views in the course. They are also to refrain from the use of any inappropriate language anywhere within the course.

Unwelcome conduct directed toward another person based upon that person's actual or perceived race, actual or perceived gender, color, religion, age, national origin, ethnicity, disability, or veteran status, or for any other reason, may constitute a violation of University Policy 406, The Code of Student Responsibility. Any student suspected of engaging in such conduct will be referred to the Office of Student Conduct.

Assignment Deadlines and Extra Credit: **I expect you to turn in assignments as scheduled** - except due to extraordinary circumstances or participation in a college sanctioned event. I will not accept late assignments. There will be **no individual extra credit**.

Exams: **All examinations will be administered online and occur as scheduled.** If you miss an exam for what you believe to be a valid reason, you must provide documentation for me to consider allowing a make-up. You are expected to adhere to the following procedures while taking these exams:

- You are to take the test by yourself; no group effort or help from outside people.
- You may NOT use your book and/or notes (unless explicitly directed to do so).
- You will have the full class period to complete each exam.
- You must remain seated in front of your virtual classroom camera throughout the exam.
- Your virtual classroom camera must remain ON throughout the exam.
- If your computer freezes, get back into the test as quickly as you can. As soon as you complete the test, send me an email detailing your problem.
- If you lose your ability to access the Internet during an exam, email me immediately when you have service, do not wait!

Academic Integrity: Students are responsible for knowing and following the UNCC Code of Student Academic Integrity <http://www.legal.uncc.edu/policies/ps-105.html> and the UNCC Code of Student Responsibility <https://legal.uncc.edu/policies/up-406> in all aspects of their work in this course. This code forbids cheating, fabrication or falsification of information, multiple submissions of academic work, plagiarism, abuse of academic materials, and complicity of academic dishonesty. Standards of academic integrity will be enforced in this course.

Accommodations: Students in this course seeking accommodations to disabilities must first consult with the Office of Disability Services and follow the instructions of that office for obtaining accommodations.

Copyright: My lectures and course materials, including videos, presentations, tests, exams, outlines, and similar materials, are protected by copyright. I am the exclusive owner of copyright in those materials I create. I encourage you to take notes and make copies of course materials for your own educational use. However, you may not, nor may you knowingly allow others to reproduce or distribute lecture notes and course materials publicly without my express written consent. This includes providing materials to commercial course material suppliers or other similar services. Students who publicly distribute or display or help others publicly distribute or display copies or modified copies of an instructor's course materials may be in violation of University Policy 406, The Code of Student Responsibility. Similarly, you own copyright in your original papers and exam essays. If I am interested in posting your answers or papers on the course web site, I will request your written permission.

## Course Requirements:

Class Participation (all students): Each student is required to attend class and actively participate (take notes, ask questions, and complete in-class activities) throughout the period. **All virtual classroom cameras must remain on throughout each class period.** Use of cell/smart phones, email, texting, and/or personal music players during class is strictly prohibited.

Weather Briefings (all students): Each student will be required to lead one weather briefing during the semester. Briefings will occur at the end of class and last no longer than 15 minutes. Briefings should focus on **mesoscale events** across the **continental United States**. *Students not leading the briefing are expected to participate by asking questions and/or providing alternative interpretations.* A list of topics that should be covered during each briefing and the evaluation rubric are available on the course website. Briefings will occur after spring break.

Homework (all students): A total of six homework assignments will be given. Each homework assignment will consist of in-depth exercises related to the current topic(s). You are required to show and/or explain your work on all homework assignments. **Access to a color printer is required.**

Paper Presentation (ESCI 5350 students only): Each graduate student will read and orally present a professional journal article on a mesoscale phenomenon. Oral presentations (18-20 minutes in length) should include a summary of the article's methods and results, as well as a critique of the data, methods, and/or results. The article may be chosen from the provided list or selected independently. All articles must be approved by the instructor. A list of potential articles and the evaluation rubric are available on the course website.

Exams (all students): All exams will be given in class and will be closed book. There will be two exams during the semester (March 8 and April 19) and a cumulative final exam (TBD). The final exam day and time **may not** be rescheduled; plan the end of your semester to accommodate the university-designated final exam time (see <http://registrar.uncc.edu/calendar-and-exam-schedules/exam-schedules>).

## Evaluation:

The grading scale will be a standard percentile scale. Your final grade will be calculated using the following point distribution.

|                             | METR 4350 | ESCI 5350 |                |              |
|-----------------------------|-----------|-----------|----------------|--------------|
|                             |           |           | <u>Percent</u> | <u>Grade</u> |
| Class Participation         | 25        | 25        | 90-100         | A            |
| Weather Briefing            | 25        | 25        | 80-89          | B            |
| Homework (6 @ 25 pts. each) | 150       | 150       | 70-79          | C            |
| Paper Presentation          | ---       | 50        | 60-69          | D            |
| Exam-1                      | 50        | 50        | 0-59           | F            |
| Exam-2                      | 50        | 50        |                |              |
| Cumulative Final Exam       | 100       | 100       |                |              |
|                             |           |           |                |              |
| Total Points                | 400       | 450       |                |              |

## Tentative Class Schedule:

| <b>Week</b> | <b>Date</b> | <b>Subject</b>                                | <b>Reading</b>        |
|-------------|-------------|---|-----------------------|
| 1           | Mon 1/18    | <b>No Class – MLK Day</b>                     |                       |
|             | Wed 1/20    | Introduction to the Course and the Mesoscale  | Chapter 1             |
| 2           | Mon 1/25    | Synoptic and Mesoscale Fronts                 | Chapter 5             |
|             | Wed 1/27    | Synoptic and Mesoscale Fronts                 |                       |
| 3           | Mon 2/01    | Deep Convection – Initiation                  | Chapters 4 and 7      |
|             | Wed 2/03    | Deep Convection – Initiation                  |                       |
| 4           | Mon 2/08    | <b>No Class – Spring Break</b>                |                       |
|             | Wed 2/10    | <b>No Class – Spring Break</b>                |                       |
| 5           | Mon 2/15    | Deep Convection – Classifications             | Chapter 8.1 – 8.4.2   |
|             | Wed 2/17    | Deep Convection – Classifications             |                       |
| 6           | Mon 2/22    | Deep Convection – Physical Processes          | Chapter 2 and 3.1     |
|             | Wed 2/24    | Deep Convection – Physical Processes          |                       |
| 7           | Mon 3/01    | Deep Convection – Physical Processes          |                       |
|             | Wed 3/03    | Deep Convection – Physical Processes          |                       |
| 8           | Mon 3/08    | <b>Exam 1</b>                                 |                       |
|             | Wed 3/10    | Deep Convection – Forecast Parameters         | SPC – Website         |
| 9           | Mon 3/15    | Deep Convection – Forecast Parameters         |                       |
|             | Wed 3/17    | Deep Convection – Forecast Parameters         |                       |
| 10          | Mon 3/22    | Supercells                                    | Chapter 8.4.3 – 8.4.5 |
|             | Wed 3/24    | Supercells                                    |                       |
| 11          | Mon 3/29    | Supercells                                    |                       |
|             | Wed 3/31    | Supercells                                    |                       |
| 12          | Mon 4/05    | Tornadoes                                     | Chapter 10.1          |
|             | Wed 4/07    | Tornadoes                                     |                       |
| 13          | Mon 4/12    | Tornadoes                                     |                       |
|             | Wed 4/14    | Tornadoes                                     |                       |
| 14          | Mon 4/19    | <b>Exam 2</b>                                 |                       |
|             | Wed 4/21    | Squall Lines                                  | Chapter 9 & 10.2-10.4 |
| 15          | Mon 4/26    | Squall Lines                                  |                       |
|             | Wed 4/28    | Squall Lines                                  |                       |
| 16          | Mon 5/03    | Squall Lines                                  |                       |
|             | Wed 5/05    | <b>Graduate Student Presentations</b>         |                       |
| 17          | Wed 5/12    | <b>Cumulative Final Exam (5:00 – 7:30 pm)</b> |                       |