METR 4350 / ESCI 5350
MESOSCALE METEOROLOGY
SPRING 2025

Instructor: Dr. Matthew Eastin
mdeastin@charlotte.edu

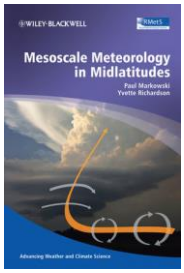
Class Time: Monday / Wednesday at 4:00 – 5:15 pm
Class Location: McEniry 118

Office: McEniry 209
Office Hours: Monday / Wednesday 9-10 am and 1-2 pm

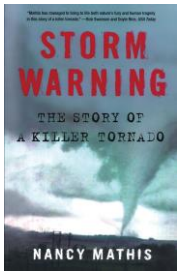
Teaching Assistant: Logan Twohey
McEniry 426
ltwohey@charlotte.edu

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)

Course Policies:

Attendance and Participation: Attendance is essential to maintaining an effective learning environment. Regular class attendance and active participation is expected. Attendance will be taken twice during each class period – five minutes after the start of class (at 4:05 pm) and five minutes before the end of class (at 5:10 pm). You must be present both times to earn attendance credit for any given class day. **Use of smart phones, email, texting, music players, headphones, earbuds, or any form of social media (including its use on tablets and laptops) during class is strictly prohibited.**

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 in the classroom on the scheduled date unless you have formal accommodation through the Office of Disability Services. If you miss an exam for what you believe to be a valid reason, you must provide written documentation (supporting the reason for your absence) before any consideration of a make-up exam is made.

Accommodation: Students seeking any disability accommodation must first consult the Office of Disability Services and follow the instructions provided by that office for obtaining accommodation.

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 the course.

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.

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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. Attendance will be taken twice during each class period – five minutes after the start of class (at 4:05 pm) and five minutes before the end of class (at 5:10 pm). You must be present both times to earn attendance credit for any given class day. **Use of smart phones, email, texting, music players, headphones, earbuds, or any form of social media (including its use on tablets or laptops) during class is strictly prohibited**. Any student observed using such media during class (either during lecture or during in-class activities) will lose all attendance and participation points for that day.

Reading Quizzes (all students): A total of ***six reading quizzes*** will be given. Each quiz will cover content from the assigned reading (see semester schedule below) that students are expected to complete ***before*** the material is covered in lecture. Hence, reading the assigned textbook sections ahead of time will be critical to passing the quizzes. Quizzes will be given during the first 10 minutes of a class. Your overall quiz grade will be based on your ***highest five quiz scores*** (i.e., the lowest quiz score will be dropped). There will be ***no make-up quizzes***.

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 [or the ability to modify/save (i.e., draw on) an image or PDF file 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 in class and closed notes/book. There will be two exams during the semester (**February 26** and **April 16**) and a cumulative final exam (**May 7**). The final exam day/time ***may not*** be rescheduled; plan your semester to accommodate the university-designated final exam time (see https://ninercentral.charlotte.edu/courses-registration/registration-resources/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
Class Participation	20	20
Reading Quizzes (5 @ 6 pts each)	30	30
Homework (6 @ 25 pts. each)	150	150
Paper Presentation	---	50
Exam-1	50	50
Exam-2	50	50
Cumulative Final Exam	100	100
Total Points	400	450

Percent	Grade
90-100	A
80-89	B
70-79	C
60-69	D
0-59	F

Tentative Class Schedule:

Week	Date		Subject	Reading	Quizzes
1	Mon	1/13	**No Class – AMS Conference**		
	Wed	1/15	**No Class – AMS Conference**		
2	Mon	1/20	**No Class – MLK Day**		
	Wed	1/22	Introduction to the Mesoscale	Section 1	
3	Mon	1/27	Synoptic and Mesoscale Fronts	Sections 5 and 7	Quiz-1
	Wed	1/29	Synoptic and Mesoscale Fronts		
4	Mon	2/03	Deep Convection – Initiation		
	Wed	2/05	Deep Convection – Initiation		
5	Mon	2/10	Deep Convection – Classifications	Sections 8.1 – 8.4.2	Quiz-2
	Wed	2/12	Deep Convection – Classifications		
6	Mon	2/17	Deep Convection – Physical Processes	Sections 2.6, 2.7, 3.1	Quiz-3
	Wed	2/19	Deep Convection – Physical Processes		
7	Mon	2/24	Deep Convection – Physical Processes		
	Wed	2/26	**Exam 1**		
8	Mon	3/03	**No Class – Spring Break**		
	Wed	3/05	**No Class – Spring Break**		
9	Mon	3/10	Deep Convection – Forecast Parameters	SPC – Website	
	Wed	3/12	Deep Convection – Forecast Parameters		
10	Mon	3/17	Deep Convection – Forecast Parameters		
	Wed	3/19	Deep Convection – Forecast Parameters		
11	Mon	3/24	Supercells	Sections 8.4.3 – 8.4.5	Quiz-4
	Wed	3/26	Supercells		
12	Mon	3/31	Supercells		
	Wed	4/02	Supercells		
13	Mon	4/07	Tornadoes	Section 10.1	Quiz-5
	Wed	4/09	Tornadoes		
14	Mon	4/14	Tornadoes		
	Wed	4/16	**Exam 2**		
15	Mon	4/21	Squall Lines	Section 9	Quiz-6
	Wed	4/23	Squall Lines		
16	Mon	4/28	Squall Lines		
	Wed	4/30	Course Review		
17	Wed	5/07	**Cumulative Final Exam (5:00 – 7:30 pm)**		