

**METR 4245 / ESCI 5251  
ADVANCED SYNOPTIC METEOROLOGY  
FALL 2021**

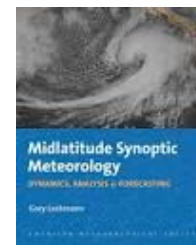
**Instructor:** Dr. Matthew Eastin  
[mdeastin@uncc.edu](mailto:mdeastin@uncc.edu)

**Class Time:** Monday / Wednesday at 2:30 – 3:45 pm  
**Class Location:** McEniry 118

**Office:** Cedar 35A / McEniry 209  
**Office Hours:** Monday / Wednesday 10–11 am and 1–2 pm

**Teaching Assistant:** None

**Text (Required):** **Midlatitude Synoptic Meteorology**  
Gary Lackmann  
AMS 2011



**Course Description:** This course provides an integrated view of synoptic and dynamic meteorology with a focus on the structure, evolution, and dynamics of synoptic-scale mid-latitude systems. Topics include conceptual models and analysis techniques for synoptic waves, cyclones, fronts, jets, and regional precipitation events.

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

1. Know the limiting assumptions associated with dynamics-based analysis techniques.
2. Identify environmental conditions supportive of midlatitude cyclone intensification.
3. Forecast midlatitude cyclone evolution using dynamics-based analysis techniques.
4. Forecast surface front evolution using dynamics-based analysis techniques.
5. Prepare a concise and informative synoptic 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:**

**Face Masks:** In accordance with university policy, all students and faculty are required to wear a mask over their nose and mouth while indoors. Therefore, all students are required to wear a mask throughout all in-person class periods. No masks are required during virtual/online classes.

**Attendance and Participation:** Attendance is essential to maintaining an effective learning environment. Regular class attendance and active participation is expected. During any virtual classes, active participation requires your virtual classroom camera to be “on” throughout the period. **Use of smart phones, email, texting, or music players during class is strictly prohibited.**

Course Etiquette: Open and mutually respectful communication of varied opinions, beliefs, and perspectives during classroom or 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 either in the classroom or online. **All exams will 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 online 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 during 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 seeking disability accommodations 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, homework assignments, 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.

## 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. During any virtual classes, your virtual classroom camera must remain ON throughout the class period. **Use of cell/smart phones, email, texting, and/or music players during class is strictly prohibited.**

Weather Briefings (all students): Each student is required to lead one weather briefings during the semester. Briefings should focus on **synoptic-scale** events that are occurring or could potentially occur across the **continental United States**. A list of expected briefing topics and the evaluation rubric are available on the course website. Briefings will begin after the first exam.

National Weather Forecasting Game (all students): Each student is required to participate in the WxChallenge (<http://www.wxchallenge.com/>) national weather forecasting game. You will be competing against over 1000 students from across the country (and me)! You will be evaluated on your participation and overall performance with the five cities for which we will be forecasting. Details regarding sign-up and the evaluation rubric are on the course website.

Homework (all students): A total of eight homework assignments will be given. Each homework will consist of in-depth exercises related to the recent topics and will involve the examination of case-study data from a variety of observing platforms and numerical models. You are required to show and/or explain your work on all homework assignments. **Access to a color printer is required.**

Paper Presentation (ESCI 5251 students only): Each graduate student will read and orally present a professional journal article on a synoptic-scale phenomenon. Oral presentations (18-20 minutes) should include a summary of the article's methods and results. The article 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 during class (either in-class or online) and will be closed book. There will be two exams during the semester (on **September 29** and **November 1**) and a cumulative final exam (**December 13, 2:00-4:30 pm**). The final exam day/time **may not** be rescheduled; plan your semester end 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 4245	ESCI 5251	Percent	Grade
Class Participation	50	50	90-100	A
Weather Briefing	25	25	80-89	B
National Forecasting Game	25	25	70-79	C
Homework (8 @ 25 pts. each)	200	200	60-69	D
Paper Presentation	---	100	0-59	F
Exam #1	50	50		
Exam #2	50	50		
Cumulative Final Exam	100	100		
Total Points	500	600		

**Tentative Class Schedule:**

<b>Week</b>	<b>Date</b>	<b>Subject</b>	<b>Reading</b>
1	Mon 8/23	Introduction to the Course	
	Wed 8/25	Review of Synoptic and Dynamic Meteorology	Chapter - 1
2	Mon 8/30	Quasi-Geostrophic Theory and Application	Chapter - 2
	Wed 9/01	Quasi-Geostrophic Theory and Application	
3	Mon 9/06	<b>No Class – Labor Day</b>	
	Wed 9/08	Quasi-Geostrophic Theory and Application	
4	Mon 9/13	Quasi-Geostrophic Theory and Application	
	Wed 9/15	Quasi-Geostrophic Theory and Application	
5	Mon 9/20	Quasi-Geostrophic Theory and Application	
	Wed 9/22	Quasi-Geostrophic Theory and Application	
6	Mon 9/27	Quasi-Geostrophic Theory and Application	
	Wed 9/29	<b>Exam #1</b>	
7	Mon 10/04	Isentropic Analysis	Chapter - 3
	Wed 10/06	Potential Vorticity Analysis	Chapter - 4
8	Mon 10/11	<b>No Class – Fall Break</b>	
	Wed 10/13	Baroclinic Instability	Chapter - 7
9	Mon 10/18	Mid-latitude Cyclogenesis	Chapter - 5
	Wed 10/20	Mid-latitude Cyclogenesis	
10	Mon 10/25	Lifecycle of the Classic Mid-latitude Cyclone	
	Wed 10/27	Lifecycle of the Classic Mid-latitude Cyclone	
11	Mon 11/01	<b>Exam #2</b>	
	Wed 11/03	Fronts – Definition and Observational Aspects	Chapter - 6
12	Mon 11/08	Fronts – Definition and Observational Aspects	
	Wed 11/10	Frontogenesis – Kinematics and Dynamics	
13	Mon 11/15	Frontogenesis – Kinematics and Dynamics	
	Wed 11/17	Frontogenesis – Kinematics and Dynamics	
14	Mon 11/22	<b>No Class – Professional Travel</b>	
	Wed 11/24	<b>No Class – Thanksgiving Break</b>	
15	Mon 11/29	Jet Streaks	
	Wed 12/01	Jet Streaks	
16	Mon 12/06	Numerical Models	
	Wed 12/08	Numerical Models <b>Paper Presentations by Graduate Students</b> Course Review and Evaluation	
17	Mon 12/13	<b>Cumulative Final Exam: 2:00 – 4:30 pm</b>	