

**METR 4110 / ESCI 5110
ATMOSPHERIC INSTRUMENTATION
FALL 2021**

Instructor: Dr. Matthew Eastin
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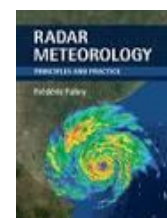
Class Time: Monday / Wednesday / Friday at 11:15 – 12:05 pm
Class Location: McEniry 203

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

Teaching Assistant: None

Text (Required): *Meteorological Measurements & Instrumentation*
R. Giles Harrison
Wiley-Blackwell Publishing

Radar Meteorology – Principles and Practice
Frederic Fabry
Cambridge Press



Course Description: An overview of common atmospheric measurements systems and their applications. Particular attention is paid to surface, sounding, radar, and satellite systems.

Course Student Learning Objectives (SLOs):

1. Know how modern surface weather stations sounding systems, weather radar systems, and weather satellite systems operate and observed the atmosphere.
2. Identify potential errors associated instrument type, siting, and operating conditions.
3. Analyze observations from surface, sounding, radar, and satellite instrumentation.
4. Diagnose atmospheric structure using use raw observations collected by the instrumentation.

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:

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. 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. 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.**

Homework (all students): A total of 6 homework assignments will be given. Each will consist of several in-depth exercises related to recent topics and may involve the examination of case study data from observing platforms. You are required to show and/or explain your work on all homework assignments. **Access to a color printer is required. Note: These six homework assignments encompass 60% of your total course grade – start early and ask questions!**

Paper Presentation (ESCI 5110 students only): Each graduate student will read and orally present a professional journal article addressing some aspect of instrumentation (i.e., instrument development, operation, quality control, and/ or application). Presentations (18-20 minutes in length) should include a summary and critique of the article's methodology and 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): There will be a mid-term exam (on October 8) and a final exam (on December 10). The final exam day/time **may not** be rescheduled; plan your end to the semester to accommodate the 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 4320	ESCI 5320
Class Participation	20	20
Homework (6 @ 30 pts. each)	180	180
Paper Presentation	---	50
Mid-Term Exam	50	50
Final Exam	50	50
Total Points	300	350

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

Tentative Class Schedule:

Week	Date	Subject	Reading
1	Mon	8/23	Introduction to the Course and Overview
	Wed	8/25	Fundamentals of Measurement / Instrumentation
	Fri	8/27	Fundamentals of Measurement / Instrumentation
2	Mon	8/30	Pressure
	Wed	9/01	Temperature
	Fri	9/03	Dewpoint / Humidity
3	Mon	9/06	No Class – Labor Day
	Wed	9/08	Wind Speed / Direction
	Fri	9/10	Wind Speed / Direction
4	Mon	9/13	Radiation
	Wed	9/15	Radiation
	Fri	9/17	No Class – Colorado Trip
5	Mon	9/20	Precipitation
	Wed	9/22	Precipitation
	Fri	9/23	Visibility / Clouds / Lightning
6	Mon	9/27	Visibility / Clouds / Lightning
	Wed	9/29	Upper Air Observations
	Fri	10/01	Upper Air Observations
7	Mon	10/04	Upper Air Observations
	Wed	10/06	Upper Air Observations
	Fri	10/08	Mid-term Exam
8	Mon	10/11	No Class – Fall Break
	Wed	10/13	Overview of Radar Systems
	Fri	10/15	Overview of Radar Systems
9	Mon	10/18	Fundamentals of Radar Beam Pulses
	Wed	10/20	Fundamentals of Radar Beam Pulses
	Fri	10/22	Radar Equations and Reflectivity
10	Mon	10/25	Radar Equations and Reflectivity
	Wed	10/27	Fundamentals of Radar Display
	Fri	10/29	Fundamentals of Radar Display
11	Mon	11/01	Doppler Radar
	Wed	11/03	Doppler Radar
	Fri	11/05	Doppler Radar
12	Mon	11/08	Doppler Radar Interpretation
	Wed	11/10	Doppler Radar Interpretation
	Fri	11/12	Polarimetric Radar
13	Mon	11/15	Polarimetric Radar
	Wed	11/17	Satellite Orbits and Navigation
	Fri	11/19	Satellite Orbits and Navigation
14	Mon	11/22	No Class – Professional Travel
	Wed	11/24	No Class – Thanksgiving Break
	Fri	11/26	No Class – Thanksgiving Break
15	Mon	11/29	Satellite Retrievals and Interpretation
	Wed	12/01	Satellite Retrievals and Interpretation
	Fri	12/03	Satellite Retrievals and Interpretation
16	Mon	12/06	Graduate Student Paper Presentations
	Wed	12/08	Graduate Student Paper Presentations
	Fri	12/10	Final Exam: 11:00 am – 1:30 pm