RADAR AND SATELLITE METEOROLOGY
ATMS 315
Fall 2023

Course Description: Radar and satellite data are used in research and weather forecasting applications across the globe. In this course we will cover the theory and application of radar and satellite remote sensing to the atmospheric sciences, including, weather analysis and forecasting, and climatological implications.

Class Meetings: TR 3:15–4:30 p.m. in RRO 238
Pre-Requisite: ATMS-204; PHYS-222
Credit hours: 3
Required Text: Rinehart, R. E., 2010: *Radar for Meteorologists*. 5th ed. Radar, ISBN: 9780965800235

Professor

Dr. Caitlin Crossett

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Office Hours: M and Th: 10–11a.m.
W: 3–4p.m. or by appointment

GENERAL INFORMATION

Webpage: The course webpage (Moodle) is referenced throughout the course and students are encouraged to access it regularly. Lecture slides, announcements, assignments, and sources of additional information will be made available on a regular basis.

ASSIGNMENTS

Homework: Homework sets will be assigned throughout the semester. These questions will be related to material discussed in class but may require you to solve a problem not directly addressed in class. We may also use class time to start analyses that will be referenced or continued in homework assignments. You are encouraged to work with other students on homework, but all work should be your own and be written in your own words. Partial credit will be given, but all steps to the solution must be shown.

Quizzes: Throughout the semester, quizzes will be given in class on each section of material. Quizzes are given to ensure that you are keeping up with course material and allow you to assess how well you are understanding course concepts before you may encounter them on an exam.

Current Event Project (CE): You each will be tasked with giving a ~10-minute presentation once during the semester on a current weather event (having occurred within a month of your assigned presentation date) in which you primarily utilize radar and satellite information in your meteorological analysis. More information will be provided on a separate handout.

Exams: Two exams, a midterm and a final, will be given in this course during class time. The first exam will cover primarily radar meteorology concepts while the second will primarily cover satellite meteorology concepts. Although exams are not cumulative, some topics in this course build upon each other, so reviewing course material throughout the semester will be beneficial to you in this

course. You are required to take the exams during the scheduled time unless other accommodations (i.e., University sponsored events, religious observances) have been cleared through me at least 48 hours before the exam. **No make-up exams will be given.**

Final Project/ Presentation: Your final project in this course will be to create and present a scientific poster of a case study of a high impact weather event utilizing primarily radar and satellite information in your analysis. Due dates for final project deliverables (i.e., project idea, outline, etc.; See D# on syllabus) will be given throughout the semester to get you thinking about your project (before the final week of the semester…) and so that I can give you feedback throughout the process. These deliverables will account for 1.5% of your final project grade. More information will be given on a separate handout later in the semester.

Course Work	% of Grade
Quizzes	15%
Homework	40%
Current Event Project	5%
Final Project/ Presentation	10%
Midterm Exam	15%
Final Exam	15%

A	92–100	C	72.0–77.9
A-	90.0–91.9	C-	70.0–71.9
B+	88.0–89.9	D+	68.0–69.9
B	82.0–87.9	D	60.0–67.9
B-	80.0–81.9	F	< 60.0
C+	78.0–79.9		

EXPECTATIONS/ COURSE POLICIES

Late Work: I will accept homework up to 24-hours late for a 50% late penalty, assignments handed in later than 24-hours will receive a zero. No exams or quizzes will be given after the day they have been assigned in class (unless arrangements have been made with me). LIFE TOKEN: You will be allowed one 48-hour extension on one outside of class assignment (i.e., not a quiz, exam, or the final project) for no penalty. You must clear this extension with me no less than 24-hours before the due date.

Academic Honesty: Any act of plagiarism, cheating, or use of unauthorized material or assistance is academic dishonesty. A person who knowingly assists another in cheating is likewise guilty of cheating. It is up to my assessment of the gravity of the offense, that a student may be punished by a failing grade or a grade of zero for the assignment or test, or a failing grade in the course. I expect that you will exercise integrity in all quizzes, exams, and written assignments. Please email me or come in during office hours if you have additional questions or need clarification on any point.

Attendance: There is no attendance policy for this course, but your success in this course is undoubtedly tied to attending lectures regularly, participating in in-class exercises (which may be referenced on homework assignments) and keeping up with course content. Please come to class on time as each class will start and end on time. If you need to arrive late, be respectful of others when you enter the classroom and find a seat. If you must leave early, please let me know before class and leave as quietly as possible so as not to disturb the class.

Technology Use: You may use laptops or tablets during class to take notes, but you may not use them for watching TV, doing work for other classes, or anything else not related course discussion. I

reserve the right to change this policy should distractions become an issue. If you have accommodations through the Office of Academic Accessibility (accessibility.unca.edu) for electronics use during class, please come talk to me.

Artificial Intelligence Tools Policy: Using an AI-content generator such as ChatGPT to complete assignments without proper attribution violates academic integrity. By submitting assignments in this class, you pledge to affirm that they are your own work and you attribute use of any tools and sources (Guides to citing AI tools can be found here). Approved uses of ChatGPT are limited to: Brainstorming ideas, fine tuning research questions, assistance with coding (i.e., finding bugs), and locating supporting information such as journal articles and web pages. If you are unsure if a specific use of ChatGPT is approved, please email, or come talk to me.

Communication: I will primarily contact you about course information through email or our course website (Moodle) so please get in the habit of checking both every day! Therefore, email is also the best way to reach me with any questions/comments/concerns (ccrosset@unca.edu). I will monitor email from 8a.m.–5p.m. during the work week and intermittently outside of these hours and during the weekend. Please allow 24 hours for me to reply to your email and please make sure you've consulted the syllabus and our course website before asking a question whose answer might be on either.

Respectful Classroom Environment: It is expected that you will be respectful of other students, the instructor, and any guest presenters while in class. Just as you expect others to actively listen to your diverse set of thoughts and perspectives, I ask that you do the same. Any disrespectful or disruptive behavior will not be tolerated, and you will be asked to leave class. If something is shared in class (by anyone, including myself) that makes you feel uncomfortable, please let me know.

UNIVERSITY RESOURCES

Accessibility: UNC-Asheville values the diversity of our student body as a strength and a critical component of our dynamic community. Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to this class should let the professor know, and/or make an appointment to meet with the Office of Academic Accessibility as soon as possible. To make an appointment, call 828.232.5050 or email academicaccess@unca.edu. Learn more about the process of registering, and the services available through the Office of Academic Accessibility here: accessibility.unca.edu

Mental Health Support: As a student, you may experience a range of challenges that can interfere with learning, such as stressful life events, experiences of anxiety and/or depression, self-harm, substance use, and/or unusual difficulty with ordinary life activities. The increased stress of school can also make existing mental health struggles more difficult to manage. Support is available and treatment can help. Learn more about the confidential mental health services UNC Asheville provides to support student success at https://www.unca.edu/life/health-counseling/. The Health and Counseling Center is located at 118 W.T. Weaver Boulevard. Appointments can be made by calling 828-251-6520. A UNC Asheville counselor on call is available after 5 p.m. and on weekends; the counselor on call can be accessed by calling the UNCA Campus Police dispatcher at 828-251-6710. Additionally available after hours and on weekends, call the Bulldog Health Link at 1-888-267-

3675, where you can get immediate support for mental health, medical consultation, concern for a friend, and/or community resources. In case of an emergency, you can also call RHA's Mental Health Mobile Crisis Unit at 1-888-573-1006.

COURSE SCHEDULE (subject to change) – ATMS 315 – Fall 2023 ** Assignments are due at the beginning of class on the day they are listed in the course schedule unless otherwise noted.

Week	Date	Topic	Reading	Assignment
1	22-Aug	Intro to Remote Sensing		
	24-Aug	History of Radar Meteorology/ Radar Basics	Chapters 1–2	
2	29-Aug	Radar Basics	Chapter 3	
	31-Aug	Radar Basics		Quiz
3	5-Sep	Radar Equation	Chapters 4–5	
	7-Sep	Radar Equation		
4	12-Sep	Reflectivity Data	pp. 97–112; 142–146; Ch. 9	Quiz
	14-Sep	Doppler Velocity		HW1
5	19-Sep	Doppler Velocity		
	21-Sep	AWIPS II -- Radar Data		Quiz
6	26-Sep	Dual-pol Radar Data	Chapter 10	CE1–*Sonney*
	28-Sep	Dual-pol Radar Data		CE2–*Johnson*
7	3-Oct	Rain Rate Estimates	pp. 133–139	CE3–*Cox*
	5-Oct	Mesoscale Weather Systems		CE4–*Mitchell* HW2 (Due: 6 Oct)
8	10-Oct	**NO Class - Fall Break**		
	12-Oct	**Midterm Exam: Radar Meterology**		
9	17-Oct	Introduction to Satellite Meteorology		CE5–*Abdullayev* D1
	19-Oct	Satellite Orbits		CE6–*Leveille*
10	24-Oct	Satellite Basics		Quiz
	26-Oct	Satellite Basics		CE7–*Rearden*
11	31-Oct	Radiation Theory		CE8–*Morley* D2
	2-Nov	Radiation Theory		Quiz; HW3
12	7-Nov	GOES-16 Satellite		CE9–*Duckett*
	9-Nov	GOES-16 ABI Channels		CE10–*Simmons*
13	14-Nov	Visible/Infrared Image Interpretation		CE11–*Michaelson*
	16-Nov	Identifying Cloud Types		Quiz; D3
14	21-Nov	Water Vapor Image Interpretation		HW4
	23-Nov	**NO Class - Thanksgiving Break**		
15	28-Nov	**NO Class - Undergraduate Research Day**		
	30-Nov	SS Weather Systems		
16	5-Dec	**Final Exam: Satellite Meteorology**		Optional Poster Draft by 5p.m.
Tuesday	12-Dec	**Final Presentations – 11:30a.m. – 2:00p.m.**		**Final Poster and Presentation**