

PHYSICAL CLIMATOLOGY

ATMS 223

Fall 2023

Course Description:

In this course we will analyze the causes of spatial and temporal climate variation from a physical perspective, with special emphasis on energy balance, feedback mechanisms, and climate modeling. We will also apply the above to understanding natural variability of the climate in the present and past and the science of human-induced climate change.

Class Meetings: MW 12:30–1:45 p.m. in RRO 238

Pre-Requisite: ATMS-103

Credit hours: 3

Professor

Dr. Caitlin Crossett

Office: RRO 251

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Email: ccrosset@unca.edu

Office Hours: M and Th: 10–11 a.m.

W: 3–4 p.m. or by appointment

GENERAL INFORMATION

Required Text: Hartmann, D. L., 2016: *Global Physical Climatology*. 2nd ed. Elsevier, ISBN: 9780123285317

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.

Visit <http://www.atms.unca.edu/slos.shtml> for a list of the student learning outcomes for the Department of Atmospheric Sciences.

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. 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 intermittently in class on course material discussed before the quiz. 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 the exam.

Exams: Two exams, a midterm and a final, will be given in this course during class time. Each exam will only cover material from before the previous exam (i.e., not cumulative). Although exams are not cumulative, many 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: You will be tasked with summarizing a chapter out of the National Climate Assessment and connecting it to course material. 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 5% of your final paper grade. Therefore, it's in your best interest to complete them. More information will be given on a separate handout later in the semester.

Course Work	% of Grade
Quizzes	15%
Homework	40%
Final Paper & Presentation	15%
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. This also does not include Homework #3. 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 and keeping up with course content. Please come to class on time. 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 to 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 223 – 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	21-Aug	Introduction to Climate System	pp. 1–13, 17–22	
	23-Aug	Introduction to Climate System		
2	28-Aug	Global Energy Balance	Chapter 2	
	30-Aug	Global Energy Balance		Quiz
3	4-Sep	NO Class - Labor Day		
	6-Sep	Global Energy Balance		
4	11-Sep	Energy Balance of the Surface	pp. 95–111, 115–129	
	13-Sep	Energy Balance of the Surface	pp. 74–78, 83–87	HW1
5	18-Sep	The Hydrologic Cycle	pp. 131–152	Quiz
	20-Sep	The Hydrologic Cycle		
6	25-Sep	Atmospheric General Circulation and Climate	Chapter 6	
	27-Sep	Atmospheric General Circulation and Climate		Quiz
7	2-Oct	Ocean General Circulation and Climate	Chapter 7	D1
	4-Oct	Ocean General Circulation and Climate		HW2
8	9-Oct	NO Class - Fall Break		
	11-Oct	NO Class - Prof. Crossett Traveling		
9	16-Oct	Midterm Exam: Chapters 1–6		
	18-Oct	Dvietsen and Dvitetsen Discussion	Dvietsen and Dvietsen (2023)	HW3
10	23-Oct	Cryosphere		Quiz
	25-Oct	Natural Intraseasonal and Interannual Variabilty	Chapter 8	
11	30-Oct	Natural Intraseasonal and Interannual Variabilty		D2
	1-Nov	Paleoclimate	Chapter 9	
12	6-Nov	Paleoclimate		Quiz
	8-Nov	Climate Sensitivity and Feedback Mechanisms	Chapter 10	
13	13-Nov	Climate Sensitivity and Feedback Mechanisms		
	15-Nov	Natural Climate Change	Chapter 12	HW4
14	19-Nov	Natural Climate Change		Quiz
	22-Nov	NO Class - Thanksgiving Break		
15	27-Nov	Anthropogenic Climate Change	Chapter 13	D3
	29-Nov	Anthropogenic Climate Change		
16	4-Dec	Final Exam: Chapters 7–13		Optional Draft by 5p.m.
Monday	11-Dec	Final Presentations: 11:30a.m. – 2:00p.m.		Final Paper and Presentation