NRES 478/878: Regional Climatology

Spring semester, 2011 (Cross-listed as METR 478/878)

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Office hours Wednesdays (any time, by appointment; please send e-mail)

Lecture/Lab TR 9:00am-10:15pm; 200 Hardin Hall

Prerequisites METR 351 (Basic and Applied Climatology) or permission of instructor. Students are expected to have a good, basic understanding of atmospheric science and some prior exposure to principles of climatology.

Course Description Regional differentiation of the climates of the earth on both a descriptive and dynamic basis. Analysis of the chief systems of climatic classification.

Learning Objectives This course is designed to provide upper-level undergraduate and graduate students with an understanding of the global climate system and its regional variability and dynamics. Specifically, the course learning objectives are designed to reinforce and develop students' understanding of the following areas:

1) Basic atmospheric principles (review)
2) Global circulation patterns and regional geographic controls on climate
3) Köppen and Thornthwaite climate classification schemes
4) Climate dynamics (temperature, circulation, precipitation, seasonality, etc.) of the tropics, subtropics, mid-latitudes, and polar regions
5) Regional climate pattern analysis using global atmospheric datasets
6) Experience with climate plotting tools such as the Grid Analysis and Display System (GrADS)
7) Atmospheric teleconnection patterns such as the El Niño–Southern Oscillation (ENSO), Arctic Oscillation (AO), Pacific Decadal Oscillation (PDO), etc.
8) Global and regional climate change (past and future; natural and anthropogenic)
9) Case studies of unique climates in specific regions (e.g., the Arctic, South America, West Africa, and the Great Lakes; monsoon, desert, and high-altitude regions, etc.)

Textbook There is no required textbook for this course, since a standard textbook for regional climatology does not exist. Instead, required readings will be drawn from journal articles in the peer-reviewed scientific literature. These readings will either be provided online (through Blackboard – http://my.unl.edu) or handed out in class.

Grade Weighting

Undergrads (NRES/METR 478):
1) Two exams (30%)
2) Labs (30%)
3) Case study (20%)
4) Class participation (20%)

Graduate students (NRES/METR 878):
1) Two exams (30%)
2) Labs (30%)
3) Case study (20%)
4) Lecture / Discussion leadership (15%)
5) Class participation (5%)

Grading Scale	90–100%:	A– / A / A+
	80–90%:	B– / B / B+
	70–80%:	C– / C / C+
	60–70%:	D– / D / D+
	< 60%:	F

Exams Two exams will be administered during the semester (see course calendar) to test your knowledge of global circulation patterns, geographic controls on regional climate, Köppen and Thornthwaite climate classification schemes, and the climate dynamics of the tropics, subtropics, mid-latitudes, and polar regions. The exams will be a combination of essay and short-answer questions. **Make-up policy:** If you miss an exam because of an official, university-excused absence, you must give prior notice by e-mail that you will be absent, and you must schedule a make-up exam at that same time. Make-up exams for any other type of absence will not be provided.

Labs Labs will (typically) be held every other Thursday (beginning around the 4th week of classes) in the computer room in 200 Hardin Hall (same as lecture). These lab periods are intended to familiarize you with a computer graphics package known as the Grid Analysis and Display System (GrADS), as well as to develop your skills in using this software to analyze global and regional climate patterns, climate change, case studies of particular regional climates, and/or global teleconnection patterns. We may also occasionally use Microsoft Excel to perform numerical and graphical analysis. You will work with your lab partner to summarize your findings into a written lab report for each lab period (in the form of a Powerpoint or PDF file). Lab reports will be due via e-mail at least **24 hours prior to the next lab period**, unless stated otherwise. Your lab group may also be asked to present your lab report to the rest of the class at least once during the semester. **Your final lab grade will be based on three factors:** 1) the quality of your lab reports (60%), 2) lab participation (30%), and 3) the quality of your class presentation (10%+extra credit).

Case Study All students are required to complete a research project in which they undertake a case study of a specific regional climate. The project must contain a review of the relevant literature, a thought-provoking analysis of climate data from that region, and a 15-minute oral presentation to the rest of the class (during final exam week).

Class Participation Beginning around the 4th week of classes, most class periods will include a discussion of the previously assigned reading. These discussions will be led by one of the graduate students in the class. However, participation is expected from every student, and a portion of your final grade will be based on your level of class participation and clear evidence of critically reading the material (A=excellent, B=good, C=average, D=poor, or F=no participation).

Lecture / Discussion It's been said that "one of the best ways to learn a subject is to teach it to others." **Graduate students** in this class will be expected to do just that: Develop their critical reading, analysis, presentation, and discussion skills, as well as a thorough understanding of a topic, by presenting **one 45-minute lecture** to the class during the course of the semester, as well as leading the class in **one 30-minute discussion** of the assigned daily reading. Lecture topics will be chosen from those listed in the course calendar (on a first-come, first-served basis) and will be somewhat

formal, requiring the student to do significant in-depth research on the chosen topic in order to put together a thorough presentation. Discussions, on the other hand, will be more informal, and will take place on a different day than the assigned lecture. The topic will be based on assigned peer-reviewed journal articles in the area of regional climatology. Although various journal articles may be posted on Blackboard to guide the choice of material, students are encouraged to propose specific journal articles for discussion. For both the lecture and discussion periods, a grade will be assigned to each student based on their level of preparation, their ability to effectively summarize the material being presented (or article being discussed), their ability to convey a thorough understanding of the material to the rest of the class and address questions that are raised, and their **effectiveness in leading class discussion**. This last point is particularly important – the discussion sessions are meant to involve all students. So one of the primary tasks of the discussion leader is to draw input from everyone in class by raising thought-provoking questions and guiding a stimulating discussion. In other words, there **must be evidence that learning is taking place**. This requires preparation on the part of the discussion leader and **participation by all students**. The discussion leader is a facilitator of learning, not a "spoon-feeder of information."

General Policies

- Students are expected to come to class on time. If it is unavoidable that you arrive late, please take care to enter the classroom with the least amount of disruption.
- Please be respectful of your fellow students by refraining from interrupting during class discussion or dominating the conversation. We want to be sure that everyone has a chance to be heard and that every viewpoint is respected.
- Cheating, plagiarism, or any other form of academic dishonesty will **not** be tolerated and will result in a failing grade (on a lab, exam, or even the entire course). Any cases of academic dishonesty will be dealt with according to guidelines laid out in the UNL *Bulletin*.
- Please understand that you will occasionally be asked to do tasks or discuss topics that you know very little about. This is to be expected. In fact, this is one of the points of being in an institution of higher learning – to learn new things and expand your horizons. I don't expect you to come into class knowing how to do everything. (How boring would that be? Leaving a course knowing nothing more than when you first started??) I do, however, expect you to learn how to do something or at least put forth a strong effort to try and figure out how. As your instructor, I similarly commit myself to helping you learn, as well as helping you find the information you need.
- If you have any disabilities or special learning needs that I should know about, please speak to me during the first week of class so that we can make appropriate arrangements (see ADA statement below).

ADA Statement

Students with disabilities are encouraged to contact Christy Horn (472-8404) for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University of Nebraska-Lincoln to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the Services for Students with Disabilities (SSD) office, 132 Canfield Administration, 472-3787 voice or TTY.

Course calendar
(subject to change)

Month	Day	Topic	Lecture / Discussion
January	13	First day of class: Introductions, syllabus, course layout	Lenters
	18	Review of basic atmospheric principles and global climate	Lenters
	20	Review of basic atmospheric principles and global climate	Lenters
	25	Review of basic atmospheric principles and global climate	Lenters
	27	Climate classification: Köppen method	Lenters
February	1	Climate classification: Köppen method	Lenters
	3	**Lab #1: Global climate patterns**	
	8	Climate classification: Thornthwaite method	Lenters
	10	Climate classification: Thornthwaite method	Lenters
	15	**Exam #1**	
	17	**Lab #2: Tropical climates**	
	22	Tropical climatology	Lenters
	24	Tropical climatology	TBD / TBD
March	1	Climatology of the subtropics and dry regions	Lenters
	3	**Lab #3: Subtropical climates**	
	8	Climatology of the subtropics and dry regions	TBD / TBD
	10	Mid-latitude/continental climatology	Lenters
	15	Mid-latitude/continental climatology	TBD / TBD
	17	**Lab #4: Mid-latitude climates**	
	22	**No class: Spring break**	
	24	**No class: Spring break**	
	29	Polar climatology	Lenters
	31	Polar climatology	TBD / TBD
April	**5**	**Exam #2**	
	7	**Lab #5: Polar climates**	
	12	Climate variability: Oscillations and teleconnections	TBD / TBD
	14	Climate variability: Oscillations and teleconnections	TBD / TBD
	19	Climate variability: Oscillations and teleconnections	TBD / TBD
	21	**Lab #6: Teleconnection patterns**	
	26	Global and regional climate change	TBD / TBD
	28	Global and regional climate change	TBD / TBD
May	**2-6**	**Final exam week: Case study presentations**	