

METR 2603-900 – Severe and Unusual Weather

Syllabus: Spring 2010

Lecture: TR 6 – 7:15 PM, SEC A235

Instructor: Matthew Van Den Broeke (Matthew.VanDenBroeke@OU.edu)

Office: SEC 526 **Office Hours:** T 11:45 – 12:30; R 2:45 – 3:30; by appointment (email me)

Course Assistant: Anita Nallapareddy (Anita.Nallapareddy-1@OU.edu)

Course Content:

This course is designed to “provide non-majors and majors a detailed descriptive account of the physical processes important in the formation of various severe and unusual weather phenomena including: thunderstorms, tornadoes, hail storms, lightning, hurricanes, midlatitude snowstorms, lake effect snows, atmospheric optical effects, and global climate change.” It serves as a General Education Core II Natural Science Elective (non-lab).

Course Goals:

- 1) Develop a good understanding of basic atmospheric properties and processes
- 2) Be able to interpret and apply meteorological data
- 3) Think critically and scientifically about daily weather events and their underlying causes
- 4) Understand the causes, climatology, evolution, and human impacts of various types of extreme weather

Textbook: *Severe and Hazardous Weather: An Introduction to High-Impact Meteorology* (3rd ed.), by R. Rauber, J. Walsh, and D. Charlevoix (Kendall/Hunt)

Textbook Website: <http://severewx.atmos.uiuc.edu>

Course Policies:

Environment: I expect the class environment to be interactive, professional, and challenging. At the same time, I hope we can have some fun learning meteorology together. Students are expected to arrive on time, and to have laptops closed and cell phones off or silenced.

Late Policy: Your work should be turned in by the due date. If it is not, you will receive a zero. I will be understanding of emergencies that may come up—in all cases, please communicate with me. If possible, please let me know prior to class via email or in person if you are unable to turn in an assignment on time—we may be able to make other arrangements.

Lecture Notes: To make your note-taking easier, an outline of the lecture will be posted on Desire2Learn (learn.ou.edu) prior to class. Print this out and use it to help you take notes during the lecture.

Help with the Course: As your instructor, I want to see you do well in this course. If you have any questions about the material, homework, etc., see me before or after class, send me email anytime (which is the best way to communicate with me), or come to office hours. If more time

is needed we can make arrangements to meet and discuss what you're having trouble with. I expect you to take an active role in making sure you understand the course material!

Grades will be posted on Desire2Learn (learn.ou.edu). I will also use D2L to post additional materials such as homework assignments, solutions, and surveys.

Course Assessment:

Exam 1	16%
Exam 2	16%
Final Exam	22%
Homework	34%
Quizzes	12%
Extra Credit Project	up to +5%

Exams are designed to test your factual knowledge of course material and your ability to apply it meaningfully to weather situations. The final exam will be cumulative, with approximately 50% of questions coming from the last section of course material. Exams must be taken on the scheduled date. If this is not possible, please talk to me *before* the exam. In rare cases I may be able to let you take the exam on an alternate date.

Homework assignments will be varied in length and form. Some questions will help you learn the concepts, while others will take you deeper into the theory and concept application. Some assignments are designed to let you explore areas of personal interest. 8 assignments will be given during the semester. 2 will be given early in the semester and due at end, while 6 will be given as we are discussing appropriate material. All homework scores will be retained when your final grade is calculated. It is expected that all work you turn in represents your own work and thought, though working with other students is allowed. Homework will be helpful as you study for exams, so use it as a good learning opportunity!

Quizzes are unannounced and will occur on random days at the beginning of class. They will cover concepts from the past lecture or two, and basic material from the day's reading assignment. Their main purpose is to reward people who regularly come to class on time and keep up with the reading—they are designed to be easy if you've been paying attention and keeping up with the work. 7 quizzes will be administered through the semester, and your best 6 scores will be retained in the calculation of a final grade. No make-up quizzes will be allowed.

A short **Extra Credit Project** will be assigned about mid-semester and due at the end. It will allow you to bring together concepts learned in the class as you analyze a significant weather event. Other extra credit questions will be available on exams, quizzes, and homework. Thus, no curve should be applied when final grades are calculated.

The **grading scheme** for the course follows the standard OU scale:

90% - 100%	A	60% - 69.9%	D
80% - 89.9%	B	< 60%	F
70% - 79.9%	C		

Academic Honesty: Any instance of academic dishonesty will be taken seriously, and substantial penalties will be levied. For further information on OU policy, see the OU Student Academic Integrity site (<http://www.ou.edu/provost/pronew/content/integritymenu.html>) and the Academic Integrity statement (<http://www.ou.edu/provost/integrity/>).

Reasonable Accommodation: OU is committed to providing reasonable accommodation for students with disabilities. Students requiring accommodation in this course should talk to me as soon as possible. In addition, you *must* be registered with the Office of Disability Services, Goddard Health Center, Suite 166, phone 325-3852, or TDD only 325-4173. Also see <http://drc.ou.edu/content/view/16/> .

In this course it's my hope that we can have some fun learning about many interesting weather events, and that you will gain greater appreciation for the processes leading to what we see every day as weather. I also hope this course will build your critical thinking skills in a way applicable to other coursework, and to life in general. And always, if you have questions about anything in meteorology, please ask!

Schedule (Subject to minor changes)

Date	Topic	Reading Assignment	Work Due
T 19 Jan	Lecture 1: Introduction & Properties of the Atmosphere	none	
R 21 Jan	Lecture 2: Surface & Upper Air Measurements	pg. 19 - 27	Memorize the 50 states
T 26 Jan	Lecture 3: Radar, Wind Profilers, Satellites, Aircraft, NLDN	pg. 28 - 40	
R 28 Jan	Lecture 4: Forecasting and Simulating Severe Weather	pg. 63 - 79	
T 2 Feb	Lecture 5: Weather Maps: Surface & Upper-Air Observations	pg. 47 - 59	
R 4 Feb	Lecture 6: Atmospheric Stability	pg. 109 - 122	Homework 1
T 9 Feb	Lecture 7: Atmospheric Forces and Force Balances	pg. 127 - 140	
R 11 Feb	Lecture 8: Development of High and Low Pressure	pg. 145 - 160	
T 16 Feb	Lecture 9: Airmasses and Fronts	pg. 165 - 176	
R 18 Feb	EXAM 1	none	Homework 2
T 23 Feb	Lecture 10: Extratropical Cyclones East of the Rockies	pg. 181 - 198	
R 25 Feb	Lecture 11: Extratropical Coastal Cyclones	pg. 203 - 219	
T 2 Mar	Lecture 12: Freezing Precipitation & Icestorms	pg. 225 - 237	
R 4 Mar	Lecture 13: Lake-effect Snow	pg. 243 - 254	
T 9 Mar	Lecture 14: Blizzards	pg. 279 - 291	
R 11 Mar	Lecture 15: Cold Waves	pg. 259 - 274	Homework 3
T 16 Mar	NO CLASS: Spring Break!	none	
R 18 Mar	NO CLASS: Spring Break!	none	
T 23 Mar	Lecture 16: Mountain Snowstorms	pg. 295 - 311	
R 25 Mar	Lecture 17: Mountain Windstorms	pg. 315 - 328	
T 30 Mar	Lecture 18: Thunderstorms and their Environment	pg. 331 - 335	
R 1 Apr	EXAM 2	none	Homework 4
T 6 Apr	Lecture 19: Mesoscale Convective Systems (MCSs)	pg. 336 - 341	
R 8 Apr	Lecture 20: Squall Lines	pg. 342 - 345	
T 13 Apr	Lecture 21: Supercells	pg. 345 - 353	
R 15 Apr	Lecture 22: Downbursts and Microbursts	pg. 425 - 441	
T 20 Apr	Lecture 23: Hailstorms and Lightning	pg. 389-403; 407-421	
R 22 Apr	Lecture 24: Tornadoes	pg. 359 - 385	Homework 5
T 27 Apr	Lecture 25: Tropical Cyclones	pg. 463 - 494	
R 29 Apr	Lecture 26: Global Climate and Climate Change	pg. 85-104; 445-457	
T 4 May	Lecture 27: Floods, Droughts, and Heat Waves	pg. 500-508;512-518; 528-544; 552-559	Homework 6
R 6 May	FINAL EXAM, SEC A235	none	Homeworks 7 & 8; Project