

# METR 2603-900 – Severe and Unusual Weather

## Syllabus: Spring 2011

**Lecture:** TR 6 – 7:15 PM, SEC N0202A

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

**Office:** SEC N108    **Office Hours:** T 10:45 – 11:30; R 2:45 – 3:30; by appointment (email me)

**Course Assistant:** Jordan Guernsey (Jordan.Yozzo@gmail.com)

### 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 and write 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* (3<sup>rd</sup> ed.), by R. Rauber, J. Walsh, and D. Charlevoix (Kendall/Hunt). Second edition also okay.

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 note-taking easier, a lecture outline will be posted on D2L ([learn.ou.edu](http://learn.ou.edu)) before class. Print it out and use it to take notes during lecture if it's helpful.

**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	15%
Exam 2	15%
Final Exam	22%
Homework	34%
Quizzes and Participation	14%
Extra Credit Project	up to +5%

**Exams** are designed to test your 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. Special review sessions will be held at the end of the last class before each exam.

**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. 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 and writing you turn in represents your own 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! A help session will be held after the class prior to each homework due date.

**Quizzes** are unannounced and will occur on random days at the beginning or end of class. They will cover concepts from the past lecture, 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, and should be relatively easy if you've been paying attention and keeping up with the work. 8 quizzes will be given through the semester, and your best 7 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. Extra credit questions will also be available on exams, quizzes, and homework. Thus, no curve is expected when final grades are calculated.

The **grading scheme** for this 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)

**\* If you have the 2<sup>nd</sup> Edition of the textbook, the page numbers will be different—look for the appropriate chapter to read in your edition of the textbook.**

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