

## **Atm Sci 361 – Synoptic Meteorology II**

Lecture: TR 9:30-10:45a, EMS E170

Lab: W 2-3:50p, EMS W434

Spring 2015

**Instructor:** Prof. Clark Evans  
**Contact:** (414) 229-5116, evans36@uwm.edu, EMS E486  
**Office Hours:** TR 11a-12:15p, or stop by nearly anytime  
**Prerequisites:** Junior- or senior-level standing and a passing grade in Atm Sci 360  
**Course Website:** <http://derecho.math.uwm.edu/classes/AtmSci361.html>

**Teaching Assistant:** Caleb Grunzke  
**Contact:** (414) 229-5326, cgrunzke@uwm.edu, EMS W422  
**Office Hours:** To be announced.

### **Course Overview**

In this course, we are primarily interested in understanding the life cycle of mid-latitude, synoptic-scale cyclones. To aid in doing so, we introduce two concepts: quasi-geostrophic theory and isentropic analysis and potential vorticity. In lecture, we will emphasize the careful derivation and interpretation of the relevant physical and dynamical equations that guide the evolution of synoptic-scale weather systems. In lab, we will emphasize the application of the insight drawn from these equations to understand the evolution of real-world synoptic-scale meteorological phenomena.

### **Required Text**

*Midlatitude Synoptic Meteorology* by Gary Lackmann, American Meteorological Society (\$65 student member price, direct from the AMS)

We will utilize Chapters 2-6 of the text in this course. I expect that you will read the sections to be covered in class ahead of time so that you may come to class prepared to ask questions and for discussion. Lectures will largely be derived from notes prepared by the instructor that are available on the course website; these draw, to varying amounts, from the course text.

### **Grading**

Your grade will be based on your performance on the following:

45%	Examinations	[Three in total, each worth 15% of your final grade.]
45%	Labs	[Ten in total, each worth 4.5% of your final grade.]
10%	Participation	

There will be three one hour exams given during the course of the semester. All exams are closed book and non-cumulative. Make-up examinations will only be given in the event of an excused absence from class, including absences for university-recognized personal matters such as religious observances. If you are in doubt about whether your absence will qualify, please ask ahead of time and I will be happy to clarify.

There will be ten labs given during the course of the semester, each involving the application of fundamental concepts developed during lecture to data analysis. These will be assigned following the schedule outlined in the “Course Outline” section of this syllabus and due one week after their assignment except for the lab to be given on March 11, which will be due two weeks after its assignment. Late work will be accepted only with a 33% per day penalty. Exceptions will only be granted in the circumstance of an approved emergency situation. More information regarding the course lab is available in the syllabus provided by the lab instructor.

There will be several application exercises assigned during the course of the semester. These are intended to help you apply concepts from both lecture and lab to the atmosphere and, by extension, critically think about the material. Such assignments will be assigned periodically through the semester in class on Thursday and will be due in class on the following Tuesday. Exercises will be graded on a “good faith” basis, with full credit given when the assignment is completed satisfactorily and turned in on-time. As with labs, late work will be accepted only with a 33% per day penalty except in the circumstance of an approved emergency situation.

Your attendance at each scheduled class session is mandatory unless explicitly excused. Please notify me as soon as possible if you foresee needing to miss class. In the case of an absence due to an emergency situation, please notify me as soon as is feasible. Unexcused absences will result in a 1% deduction in your final course grade, per absence, after the first absence. *Please come to each lecture prepared to ask questions and to participate in discussion!* Note that participating in discussion by its very nature is associated with refraining from using your phone for any reason during lecture.

Grades will be assigned based on the following scale:

<b>A</b>	92.5-100%	<b>A-</b>	90-92.49%	<b>B+</b>	87.5-89.99%	<b>B</b>	82.5-87.49%
<b>B-</b>	80-82.49%	<b>C+</b>	77.5-79.99%	<b>C</b>	72.5-77.49%	<b>C-</b>	70-72.49%
<b>D+</b>	67.5-69.99%	<b>D</b>	62.5-67.49%	<b>D-</b>	60-62.49%	<b>F</b>	0-59.99%

A grade of an “A” is intended to reflect your mastery of the presented material. Grades of “B” and “C” are intended to reflect minor and major deficiencies, respectively, in your mastery of the

presented material. Grades of “D” and “F” reflect no mastery of the presented material. Minor deficiencies include incomplete attribution while major deficiencies include incorrect attribution.

### **Course Outline**

The following outline, apart from exam and lab dates, is provided only as a guideline.

<b><u>Week</u></b>	<b><u>Dates</u></b>	<b><u>Topic(s) To Be Covered</u></b>
1	Jan. 27, 29	The Life Cycle of Mid-Latitude Cyclones
2	Feb. 3, 5	Frontogenesis and Frontolysis
3	Feb. 10, 12	The Quasi-Geostrophic Vorticity Equation
4	Feb. 17, 19	The Quasi-Geostrophic Height Tendency Equation
5	Feb. 24, 26	The Quasi-Geostrophic Omega Equation
6	Mar. 3, 5	The Q-Vector Form of the Quasi-Geostrophic Omega Equation
7	Mar. 10, 12	Cyclone Development in the Quasi-Geostrophic System
8	Mar. 17, 19	<b>NO CLASSES – SPRING BREAK</b>
9	Mar. 24, 26	Frontal Development and Structure in the Quasi-Geostrophic System
10	Mar 31, Apr 2	Isentropic Analysis
11	Apr. 7, 9	An Introduction to Isentropic Potential Vorticity (IPV)
12	Apr. 14, 16	IPV Anomaly Structures and Impacts
13	Apr. 21, 23	Impacts of Diabatic Heating and Friction Upon IPV
14	Apr. 28, 30	Contrasting the Quasi-Geostrophic and IPV Frameworks
15	May 5, 7	Cyclone Development from an IPV Perspective

<b>Exam #1:</b>	February 26	(Weeks 1-4)
<b>Exam #2:</b>	April 2	(Weeks 5-9)
<b>Exam #3:</b>	May 14	(Weeks 10-15; 10:00 am – noon)

**Lab Dates:** Feb 11, Feb 18, Feb 25, Mar 4, Mar 11, Mar 25, Apr 8, Apr 15, Apr 22, Apr 29

I do not currently anticipate travelling during the course of the semester. If this changes, any rescheduling of lectures, labs, or examinations will be announced in advance in class.

### **Course Credit Hour Statement**

This course is a four credit course. This means that this class represents an investment of time of at least 192 hours by the average student. Of these 192 hours, 64 are associated with in-class instruction and examinations, 60 are associated with the completion of the ten course lab assignments, and the remaining 68 are associated with each student’s study of course materials.

### **Departmental Regulations**

Any and all room changes or course cancellations will be posted on departmental letterhead only.

## **University Regulations**

### **University-Wide Rights and Regulations**

The University of Wisconsin-Milwaukee has established a series of policies relating to student rights and regulations in this and all UWM-offered courses. You are encouraged to read through these policies at <http://www.uwm.edu/Dept/SecU/SyllabusLinks.pdf> at your earliest convenience. Please notify me if you need special accommodations in order to meet any course requirements.

### **Statement of Academic Misconduct**

The university has a responsibility to promote academic honesty and integrity and to develop procedures to deal effectively with instances of academic dishonesty. Students are responsible for the honest completion and representation of their work, for the appropriate citation of sources, and for respect of others' academic endeavors. Further information can be found at [http://www4.uwm.edu/acad\\_aff/policy/academicmisconduct.cfm](http://www4.uwm.edu/acad_aff/policy/academicmisconduct.cfm).

### **Statement of Sexual Harassment**

Sexual harassment is reprehensible and will not be tolerated by the University. It subverts the mission of the University and threatens the careers, educational experience, and well-being of students, faculty and staff. The University will not tolerate behavior between or among members of the University community which creates an unacceptable working environment. The draft policy on discriminatory conduct, including sexual harassment, can be found at [http://www4.uwm.edu/secu/docs/faculty/2847\\_S\\_47\\_Discriminatory\\_policy\\_clean.pdf](http://www4.uwm.edu/secu/docs/faculty/2847_S_47_Discriminatory_policy_clean.pdf).